

**A COMBINED TOMATIS AND LIFESTYLE
ENHANCEMENT PROGRAMME FOR
OVERWEIGHT FEMALE STUDENTS**

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requirements for the degree

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OPSOMMING

Die voorkoms van oorgewig en obesiteit is wêreldwyd besig om toe te neem. Dit skep 'n gesondheidsprobleem en ekonomiese las vir die samelewing a.g.v. fisiese siektes soos hartaanvalle, maar ook psigologiese gevolge soos depressie, lae selfagting, frustrasie en swak liggaamsbeeld. Die media en samelewing versterk verder die ideaal van slankheid. Universiteitstudente en adolessente is spesifiek kwesbaar om potensieel skadelike en ongesonde gewigsbeheerpraktyke toe te pas bv. lakseermiddels en dieetpille. N.a.v. multikomponent benaderings tot die terapeutiese hantering van oorgewig, het die huidige navorser besluit om die impak van 'n gekombineerde Tomatis (TM) en lewenstylverbeteringsprogram (LVP) met spesifieke klem op selfbeeldontwikkeling op oorgewig damestudente te evalueer.

Die doel van hierdie ondersoek om te bepaal of 'n gekombineerde TM en LVP sal lei tot statisties betekenisvolle: (i) vermindering van negatiewe gemoedstoestande, met tellings wat vir Groep 1 betekenisvol hoër is as dié van die groep wat slegs die lewenstylverbeteringsprogram deurloop het (Groep 2) en dié van die kontrolegroep; (ii) verbetering van psigologiese welstand, selfkonsep

en lewenstyl, met tellings wat betekenisvol hoër is vir Groep 1 as dié van Groep 2 en dié van die kontrolegroep; en (iii) vermindering van Liggaamsmassa Indeks (LI) in Groepe 1 en 2.

'n Voor- en natoetsingsontwerp bestaande uit drie groepe, is gebruik. Nege en twintig oorgewig universiteitsdames is ewekansig toegewys aan Groep 1 (TM) en LVP), (n=10); Groep 2 (slegs LVP), (n=10); en 'n kontrolegroep sonder enige intervensie (Groep 3, n=9). Groep 1 het gemiddeld 58 sessies klankstimulasie deurloop gedurende 'n 3-maande tydperk, asook 10 een en 'n half uur sessies van die LVP, terwyl Groep 2 slegs die LVP bygewoon het. Die LVP het bestaan uit 'n psigologiese-, dieetkundige-, fisieke oefening- en klerekasbeplanningskomponent. Die volgende meetinstrumente is gebruik: 'n Selfopgestelde biografiese vraelys, Die Profile of Mood States, die Tennessee Self-Concept Scale en Sence of Coherence Scale.

Beide programme was suksesvol i.t.v. vermindering van negatiewe gemoed, verbeterde selfkonsep en psigologiese welsyn. Die uitkoms van Groep 1 het nie betekenisvol verskil van dié van Groep 2 nie, maar betekenisvolle kwalitatiewe data ontsluit. A.g.v. tydsbeperkinge en onbevredigende gewigsverliesbepaling, word

aanbeveel dat daar in toekomstige studies voorsiening gemaak word vir: (i) verfynde gewigsverliesbepaling; (ii) groter, meer homogene steekproewe; (iii) intervensies oor 'n langer periode ten einde optimale lewenstylverandering te bevorder; en (iv) 'n opvolgondersoek na 3-6 maande om die blywendheid van resultate te bepaal.

SUMMARY

Worldwide, the prevalence of overweight and obesity is ascending. It is a leading public health problem and major economic burden, because of physical illnesses like congestive heart failure and psychological effects including depression, low self-esteem, frustration and disparagement of body image. Furthermore the ideal of being thin is reinforced socially and by the media. University students and adolescents are specifically vulnerable and likely to engage in potentially harmful, unhealthy weight control practices i.e. laxatives, and diet pills. In line with multicomponent approaches in dealing with overweightness, the current researcher resolved to evaluate the impact of a combined Tomatis (TM) and lifestyle enhancement programme (LEP), with specific emphasis on building self-esteem in overweight female students.

The investigation was aimed at assessing whether a combined Tomatis and LEP would lead to statistically significant: (i) reductions of negative mood states, with scores for Group 1, significantly exceeding scores obtained within and between the group only attending the LEP (Group 2) and the control group; (ii)

enhancement of psychological well-being, self-concept and lifestyle, with scores for Group 1 exceeding scores obtained by Group 2, only attending the LEP and the control group; and (iii) reduction of Body Mass Index (BMI).

A three-group pre-post-assessment design was used. Twenty nine overweight female university students were recruited and randomly assigned to Group 1 (TM and LEP), (n=10); Group 2 LEP only), (n=10); and a non-intervention control group (Group 3, n=9). Group 1 attended an average of 58 half-hour sessions of sound stimulation during a 3-month period and also 10 one and a half hour sessions of the LEP while Group 2 only attended the LEP. The LEP consisted of a psychological -, dietetic -, physical exercise – and clothing component. The following measurement instruments were used: A self-designed biographical questionnaire, The Profile of Mood States, Tennessee Self-Concept Scale, and Sense of Coherence Scale.

Both programmes proved successful in terms of reductions of negative mood states, enhanced psychological well-being and self-concept, but Body Mass Index scores remained unchanged. The outcome of Group 1 did not significantly differ from results obtained

in Group 2. Qualitatively, however, it revealed significant data. Given the time constraints and inadequate measurement of weight reduction, it is recommended that future studies involve: (i) adequate weight reduction measurement; (ii) uses larger, more homogenous samples; (iii) interventions over a longer time span to foster lifestyle enhancement; and (iv) utilizing a follow-up measurement after 3-6 months to determine retention of results.

LETTER OF CONSENT

I hereby give consent to mrs. S. van Wyk to submit her thesis in article format.

.....
Associate Professor W.F. du Plessis

Study leader

.....
Mrs. D. K. Kirsten

Co-supervisor

INTENDED JOURNAL AND GUIDELINES FOR AUTHORS

Intended journal: The International Journal of Eating Disorders.

The manuscript as well as the reference list has been styled according to the above Journal's specifications. (Manuscript submission guidelines to follow.)

Instructions for Authors

The Journal publishes basic research, clinical, and theoretical articles of scholarly substance on a variety of aspects of anorexia nervosa, bulimia, obesity, and other atypical patterns of eating behavior and body weight regulation in clinical and normal populations. Full-length articles or brief reports addressing psychological, biological, psychodynamic, socio-cultural, epidemiological, or therapeutic correlates of these clinical phenomena are welcome. Manuscripts submitted should represent a significant addition to our knowledge, or a significant review and synthesis of existing literature.

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- (5) **Appendixes**, each typed on a separate page labeled "Appendix" A, B, etc., in the order in which they are mentioned in the text.
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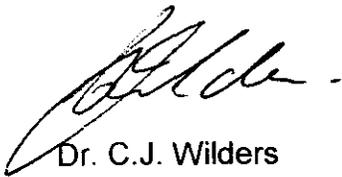
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**A COMBINED TOMATIS AND LIFESTYLE ENHANCEMENT
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PROGRAMME FOR OVERWEIGHT FEMALE STUDENTS

List of Abbreviations

LEP	Lifestyle Enhancement Programme
BMI	Body Mass Index
TM	Tomatis Method
POMS	Profile of Mood States
SOC	Sense of Coherence Scale
TSCS	Tennessee Self-Concept Scale
WHO	World Health Organization

Abstract

Objective: The aim of this study was to determine whether a combination of the Tomatis Method (TM) and a lifestyle enhancement programme (LEP) would lead to reductions of negative mood states, enhanced psychological well-being and self-concept, and reduction of BMI. **Method:** A three-group pre-post-assessment design was used. Twenty nine overweight female university students were non-randomly assigned to Group 1 (TM and LEP), (n=10); Group 2 (LEP only), (n=10) and a non-intervention control group (Group 3, n=9). **Results:** Some negative mood states were reduced, psychological well-being and self-concept enhanced but BMI remained unchanged. **Discussion:** Both programmes proved successful in terms of reduction of negative mood states, enhanced psychological well-being and self-concept. BMI remained unchanged, and the outcome of Group 1 did not significantly exceed results in Group 2, but highlighted limitations in the study such as inadequate measurement of weight reduction.

Word count: 140 words.

**A combined Tomatis and lifestyle enhancement programme for
overweight female students.**

Worldwide, the prevalence of eating disorders, including overweight and obesity is ascending (Brink, Els, & Gagiano, 1997; Oster, Thompson, Edelsberg, Bird, & Colditz, 1999; Van der Merwe, 2002; Van Dyk, 2001; Wannamethee & Shaper, 1999). These rates are over 50% higher than they were 30 years ago (Brewer, Kolotkin, & Baird, 2003). Not only has there been an increase in average body mass in women 18-34 years of age, but the number of women considered obese and overweight has also increased. It is a leading public health problem because of its complications, prevalence and difficulty to overcome (Brink et al., 1997; Oster et al., 1999; Van Dyk, 2001). The prevalence of this disorder increases with age and affects a higher percentage of women than men (Brewer et al., 2003). In South Africa 56.8% of women between 15 - 64 years are overweight or obese (Van der Merwe, 2002; Puoane et al., 2002). Young adult university students and adolescents are specifically vulnerable targets for the onset of eating disorders (Davis, 1990; Low et al. 2003; Szekely, Raffeld, & Snodgrass, 1989). Female students are especially concerned about body image and the ideal of

being thin is reinforced socially and by the media (Cash & Green, 1986; Low et al. 2003; Whisenhunt & Williamson, 2002). This unrealistic ideal may result in increased body dissatisfaction, unhealthy dieting, or eating pathology (Lowry et al., 2000; McConnell & Swan, 2000). Many women are also likely to engage in potentially harmful and unhealthy weight control practices, e.g. laxatives, vomiting and diet pills (Jambekar, Quinn, & Crocker, 2001; Low et al., 2003; Lowry et al., 2000). The above information suggests high levels of under-education regarding healthy lifestyle (Whisenhunt & Williamson, 2002).

A literature review shows a number of variables in the development of overweight (Harris, Ellison, & Clement, 1999). Cognitive factors, physical inactivity, unhealthy eating habits, sociocultural pressures, genetic, endocrine, and hypothalamic disorders, family relations and the socialization of women are possible catalysts (Brewer, et al., 2003; Durstine & Moore, 2003; Giovanni, & Marta, 1998; Heyward, 2002; Laliberté, Boland, & Leichner, 1999; Meyers & Biocca, 1992; Swain & Leutholtz, 2002). Many negative psychological effects of being overweight or obese have been reported, for example depression, emotional distress, lack of self confidence, a sense of isolation, frustration and disparagement

of body image (Allan, 1998; Brink, et al., 1997; Laliberté, et al., 1999; Oates-Johnson, & DeCourville, 1999; Sarwer, Wadden, & Foster, 1998). Body dissatisfaction has consistently been shown to be related to weight and diet preoccupation among women (Cullari, & Rohrer, 1998; Davis, Shuster, Dionne, & Claridge, 2001; McConnell & Swan, 2000). Being overweight also reduces the likelihood of entering and completing higher education degrees, lower pay rates, and reduce upward movement in socio-economic status (Jambekar et al., 2001; Wiscombe, 2002). Such women also have fewer dating partners, are rated as less attractive, seen as socially inept and criticized more frequently by family and friends (Atkinson, 2002; Jambekar et al., 2001). Because of obesity and obesity-related morbidity and mortality, it is becoming a major economic burden for society (Heseker & Schmid, 2000) and it is suggested that health professionals need to be more alert to the possibility of eating disorders in women (Striegel-Moore et al., 2003).

Being overweight also increases the risk for several physical illnesses like congestive heart failure, hypertension, gallbladder disease, cancer, dyslipidemia and diabetes mellitus (Brink et al., 1997; Lowry et al., 2000; Wannamethee & Shaper, 1999).

Treatment modalities predominantly focussing on obesity include surgical interventions (Brink et al., 1997; Jacobs, 1992), behaviour therapy, combined with cognitive therapy and principles of rational-emotive therapy (Brink, et al., 1997), diet therapy (Jacobs, 1992; Brewer et al., 2003), self-concept development (Brodie, Drew, & Jackman, 1996; Jacobs, 1992), hypnotherapy, exercise (Davis, 1990) and innovative therapies like acupuncture (Brink, et al., 1997). Naturally they are also partially relevant for being overweight.

Despite significant contributions, these programmes are often limited by predominantly focusing on single aspects, for example cognition, diet or medical considerations, while broad underlying lifestyle issues are underemphasized or totally neglected (Brewer, et al., 2003; Cash & Green, 1986; Allan, 1998). An encompassing collaborative approach, based on enhancement of a healthy lifestyle involving exercise, diet, self-concept, stress management, problem solving, decision making, assertiveness and insight may thus be more effective in reducing overweightness (Brink et al., 1997; Clifford, Tan, & Gorsuch, 1991; Geller, Brown, Zaitsoff, Goodrich & Hastings, 2003;; Senekal, Albertse, Momberg, Groenewald & Visser, 2002). Lowry et al. (2000) also propose the inclusion of multicomponent interventions which combine healthy diet and

exercise with behavior modification designed to facilitate maintenance of lifestyle changes throughout the life span. They also emphasize that tertiary settings are important for reducing the prevalence of overweight in adults as they provide numerous opportunities to positively influence physical activity, nutrition and weight management behaviours of students.

In line with multicomponent considerations for managing overweightness, the current researcher resolved to evaluate the impact of a combined Tomatis and lifestyle enhancement programme (LEP), as an extension of a pilot study (Vermeulen, 2002). She found that a combined Tomatis stimulation and psycho-educational programme led to reduced weight preoccupation in female university students and highlighted the importance of enhancing self-esteem. Despite design deficits, the combined programme proved slightly more effective than the psycho-educational programme per sé.

Thus it was assumed that a combined Tomatis and lifestyle enhancement programme (LEP), involving psychological -, dietary -, clothing - and exercise principles, would foster lifestyle changes, psychological growth and weight reduction in overweight female students.

The Tomatis Method

The TM, a programme of sound stimulation as well as psychotherapy (Tomatis, 1991; 1996) is aimed at enhancing listening skills and improving interpersonal communication. Participants' ears are systematically prepared to receive high frequency sounds through a sophisticated electronic apparatus called the "Electronic Ear". The higher frequencies are transformed into energy impulses in the inner ear, relayed to the cerebral cortex and distributed throughout the body. The purpose of the process is to stimulate and encourage the person's original "desire to communicate" (Madaule, 1994) thus reinforcing one's communication both interpersonally and intrapersonally, i.e. stimulating enhanced proprioceptive awareness (Kierman, 1986; Madaule, 1994; Tomatis, 1991; 1996; Van Jaarsveld & Du Plessis, 1989).

The right ear is also progressively stimulated to obtain effective processing of speech in the left hemisphere. Neurologically speaking, the ear provides the nervous system with almost 90% of its overall sensory energy, since high frequencies are transformed into energy impulses in the inner ear, relayed to the brain via the acoustic nerve, and believed to recharge the brain with energy and stimulate interhemispheric integration (Madaule, 1994; Thompson &

Andrews, 2000). As a result many people may feel like walking, jogging, exercising, switch to a healthy diet or stop smoking.

Thus it was assumed that overweight participants, self-conscious and apprehensive as depicted in the literature (Allan, 1998; Laliberté et al., 1999; Oates-Johnson & DeCourville, 1999), would become more receptive for the impact of the LEP while listening to sound stimulation. More specifically, it was hoped that the listening programme would strengthen their perseverance, often perceived as limited (Annesi, 2000; Harris et al., 1999). Group 1 attended the Tomatis Method somewhat informally over a period of three months, in between lectures, exercise workouts and LEP sessions and completed a mean of 58 half hour sessions.

Lifestyle Enhancement Programme (LEP)

(i). Psychological, Dietary and Clothing aspects:

The programme featuring 10 weekly group sessions, each of 1.5 hours' duration, was attended by Group 1 and 2. Session 1-8 predominantly consisted of discussions of psychological issues, underlying overeating, specifically aimed at enhancing self-concept by cognitive restructuring, visualizations of realistic body images and

communication training. A Rogerian stance of unconditional acceptance and warmth was used throughout to facilitate personal growth (Rogers, 1980).

Sessions 2-7 included brief presentations of dietary guidelines compiled by the WHO recommended as cornerstone of healthy, prudent diet (Vorster, Lowe & Browne, 2001), it was assumed that provision of relevant information, without compulsory diets, would contribute towards healthier eating habits, ultimately resulting in weight reduction. Presentations by post-graduate dietetic students of the School for Physiology, Nutrition and Consumer Sciences, evoked lively discussions.

Session 9-10, arranged at the request of participants in Group 1 and 2, provided information on clothes selection in terms of line and colour and was presented by teaching staff of The school for Physiology, Nutrition and Consumer Sciences. Although brief, this input was also deemed valuable, since research has confirmed that overweight women are mainly interested in two clothing functions, namely comfort and camouflaging (Kwon & Parham, 1994).

The aims and salient techniques across the LEP were:

Session 1:

Clarification of group structure, confidentiality and role of group leader by providing information. Knowledge of healthy lifestyle was probed by questions and discussion.

Session 2:

Augmenting knowledge of healthy nutrition; amplification thereof by experiencing a tasteful healthy stir-fry; and reconstructing mental pictures of realistic body image by means of guided visualization (Gouws, 1995; Kuczmarski, Flegal, Campbell & Johnson, 1994; Van Wyk, 1985).

Session 3-4:

Expanding awareness of body image and self-concept by rehearsing food declining skills and discussing homework collages; challenging irrational ideas underlying faulty self-concepts and expanding awareness of negative self-talk underlying overeating patterns and restructuring faulty self-talk (Beck & Weishaar, 1989; Beck, 1991; Ellis, 1997; Ellis & Whiteley, 1979).

Session 5:

Diverging group needs resulted in diverging aims and techniques. Group 1 members, already immersed in Tomatis stimulation expressed a need for more in-depth exploration of feelings underlying

negative self-talk. A Gestalt technique to demonstrate reduction of negative self talk through dialogue with one's inner "wise part" was demonstrated with the eldest Group 1 member, (A) (Perls, Hefferline & Goodman, 1973; Polster & Polster, 1973; Tillet, 1984). Group 2 continued exploring subjective self-beliefs and different roles i.e. sister, student etc.

Session 6-7

Emphasizing the importance of listening, the basis of communication and learning by stimulating discussion. Introducing coping skills, to reduce unwanted eating behaviours and explaining conflict management. Group 1 continued deeper explorations of emotional issues than Group 2.

Session 8:

Summarizing salient themes of earlier sessions and obtaining feedback on perceived positive and negative aspects.

Session 9-10

Analysis of figures, use of illusions, style, colour and texture and practical guidelines on selection of clothing, presented by teaching staff from Consumer Sciences.

(ii) Exercise aspects:

Since increased physical activity is strongly advocated as a crucial means of weight reduction (Ball, Owen, Salmon, Bauman, & Gore, 2001; Annesi, 2000), a basic exercise programme as conceptualised by Durstine & Moore (2003), Heyward (2002) and Swain & Leutholtz (2002), was attended in the Institute of Biokinetics. Body Mass Index (BMI) measures were taken prior to commencement of the programme and at programme completion. The exercise programme spanned five months, interrupted by term tests, the mid-year exam and winter recess. It was regularly attended by only 30% members of Groups 1 and 2. Despite repeated telephonic prompts, the remaining members attended irregularly claiming time constraints as reason for poor attendance.

In light of the above this investigation was aimed at assessing whether a combined Tomatis and LEP would lead to statistically significant: (i) reductions of negative mood states, exceeding scores obtained within and between the group only attending the LEP and the control group; (ii) enhancement of psychological well-being, self-concept and lifestyle, exceeding scores obtained by Group 2 and 3; and (iii) reduction of BMI exceeding scores obtained by Group 2 and

3. It was hypothesized that participation in a combined Tomatis and (LEP) would: (i) reduce negative mood states, with scores for Group 1 exceeding scores obtained by Group 2 and 3; (ii) enhance psychological well-being (as expressed in terms of sense of coherence and self concept), with scores obtained by Group 1 exceeding scores obtained by Group 2 and 3; and (iii) lead to reduced BMI scores, exceeding those of Group 2 and 3.

METHOD

Research design

A three-group, pre-post-assessment design was used.

Participants

Thirty-one mild to moderately overweight female students (BMI = 25-29) from Potchefstroom University were identified and randomly allocated to Group 1 (Tomatis stimulation & LEP), (n=11); Group 2 (LEP only), (n=10); and Group 3 (non-intervention control group), (n=10). Group 1 was reduced to 10 as one member was

discontinued for lagging behind in the listening sessions. Group 3 was reduced to 9, following desertion by one participant.

Exclusion criteria:

- (i) BMI >29, thus excluding obesity
- (ii) Formal eating disorders like bulimia nervosa
- (iii) Severe depression (>16; Beck Depression Inventory)
- (iv) Alcohol or substance abuse in previous 12 months

Procedure

The study was introduced in undergraduate Psychology students' lectures and in female residences. Prospective participants completed a BMI assessment and Beck Depression Inventory after confirming interest in the project. Individuals with BMI's ranging from 24 to 29 were informed of the project specifics and written informed consent for participation was obtained. Pre-assessment followed. Commencement of the LEP was followed by commencing the Tomatis stimulation and the physical exercises. Participants were also seen individually. The different activities were co-ordinated by the researcher.

Group 3 was offered participation in whichever programme proved most effective, but declined participation. Post-assessment was completed at four weeks post-programme.

Measuring instruments

The Profile of Mood States (POMS), a checklist of 65 items, measures various mood states including Tension-Anxiety, Depression-Dejection, Anger-Hostility, Vigor, Fatigue and Confusion (McNair, Lorr & Droppleman, 1992). Adequate test-retest reliability, internal consistency and construct validity are reported (McNair et al., 1992; Terry, Lane & Fogarty, 2003). In this study the POMS achieved an alpha coefficient ranging from 0.76-0.91 for subscales which indicated high reliability.

The Sense of Coherence Scale (SOC) of Antonovsky (1988) measures a global orientation to oneself and the environment, grounded in the idea that life events are comprehensible, manageable and meaningful (Antonovsky, 1992; 1993). It has a high level of validity and internal consistency ranging from 0.84 to 0.93 and has been linked with lower levels of depression, anxiety, life stress and physical symptoms (Antonovsky, 1993; Pallant & Lae,

2002). In this study the SOC received an alpha coefficient of 0.89 indicating high reliability.

The Tennessee Self-Concept Scale (TSCS), (Fitts and Roid, 1989) contains 100 self-descriptive items and provides a global indication of a person's self-concept as measured in 5 sub-scales being Physical Self, Moral-Ethical Self, Personal Self, Family Self, and Social Self. Roothman, Kirsten, & Wissing (2003) reported an alpha coefficient of 0.72 compared to 0.81 obtained by Fitts and Roid (1989). In this study alpha coefficients ranged from 0.67-0.88 which indicated high reliability.

A self-designed biographical questionnaire was used to elicit basic biographical information and data pertaining to being overweight.

BMI, an internationally accepted, economical and simple index to estimate body weight (Heseker & Schmid, 2000; Whisenhunt & Williamson, 2002), was determined by a biokineticist, trained in anthropometric measurement. The WHO's classification of body weight allows a comparison of obesity and overweight prevalences and offers a practical approach towards defining obesity (Heseker & Schmid, 2000). Obesity is defined as a BMI of more than 30 kilograms per square metre. These values reflect a standard of

health rather than what is normal for an individual and is gender specific (Brink et al., 1997; Mathus-Vliegen, 1998).

RESULTS

Statistical computation

The SAS System for Windows release 8.02 (1999) was used for the statistical analysis. Significance of differences within groups was computed by means of the paired t-test as well as the non-parametric Wilcoxon Signed Rank test. The differences between the three groups were measured by means of ANOVA as well as a non-parametric Kruskal-Wallis test (Miller, 1981; Steyn, Smit, Du Toit & Strasheim, 1998). A cut-off point of $p \leq 0.1$ was used as a significant difference. Effect sizes of ($d \approx 0.5$) were regarded as indicative of a tendency towards practical significance, while a large effect size of ($d \approx 0.8$) indicated practically significant differences (Cohen, 1988; Steyn, 2000).

Biographical information regarding Groups 1, 2 and 3 are presented in Table 1.

Table 1 here

From Table 1 it was clear that most participants were between 19-22 years old, with only two in the 25-30 year bracket. They were Afrikaans and with the exception of one married participant, all were single. The majority had used appetite suppressants in the past, followed diets in vain and struggled for four to five years with being overweight. In terms of religious convictions they are all practising Christians.

The significance of pre-assessment differences among Groups 1, 2 and 3 on the various variables are indicated in Table 2.

Table 2 here

From Table 2 it was clear that the three groups were comparable. The Moral-Ethical subscale of the Tennessee Self-Concept Scale differed on the Kruskal-Wallis's p-value and a co-variance analysis was done to make an adjustment due to the small sample size.

Table 3 represents significant pre-post differences within Group 1.

Table 3 here

Table 3 indicated a large practical reduction on the negative mood state, Confusion, on the POMS. Tension-Anxiety and Fatigue showed tendencies towards reduction. On the Tennessee Self-Concept Scale, the subscales Physical Self, Personal Self and Family Self also showed large practical increases. Finally a large practical increase was found in psychological well-being on the SOC.

In Table 4 significant pre-post differences in Group 2 are presented.

Table 4 here

From Table 4 it is clear that Depression-Dejection, Fatigue and Confusion, all negative mood states on the POMS, showed tendencies towards reduction. Furthermore the Vigor subscale increased significantly as well as the Physical Self and Personal Self on the TSCS. The SOC also showed a large practical increase.

Pre-post differences on all variables in Group 3 are presented in Table 5.

Table 5 here

From Table 5 it was clear that no differences occurred within the control group.

Pre-post differences on all variables between the Groups 1, 2 and 3 are illustrated in table 6.

Table 6 here

From Table 6 it was clear that there were practical differences in well-being between Groups 2 and 3 and between Groups 1 and 3. Tendencies towards differences were shown on the Vigor subscale between Groups 1 and 2 on the POMS and on Personal Self between Groups 2 and 3 on the TSCS.

DISCUSSION

In comparison to the pilot study (Vermeulen, 2002), involving the TM and a psycho-educational programme for weight preoccupied students, the current investigation represented a step closer to the domain of formal eating disorders, since participants could be characterized as overweight, on account of BMI scores. Additionally they showed features associated with overweight, i.e. failing to reduce weight by means of appetite suppressants, especially in Group 1 and almost in 50% cases in both Group 2 and 3; and failing to benefit from diets in 90% of Group 1 and Group 2 and 44% in Group 3. These findings confirmed the results of Jambekar et al. (2001), Low et al. (2003) and Lowry et al. (2000).

In light of the above, as well as the chronicity of the condition, the LEP was loaded with diverse components, deemed necessary to effect a shift towards a healthy lifestyle. It is therefore difficult to ascribe specific changes to specific components, because interaction between components cannot be discerned. Thus, it is accepted that attempts to explain findings may be somewhat speculative and possibly inaccurate. Additionally, the researcher/group leader, slightly older than the average participant, and possibly perceived as role model, who had to respond to many

personal questions, probably also impacted the groups meaningfully in non-specific ways.

Broadly speaking, the combined Tomatis and LEP resulted in encouraging, positive outcomes, thus providing psychometric support for the hypothesis that participation in the combined programme would result in lowered negative mood states, improved self-concept and enhanced psychological well-being. However, the combined programme did not achieve significantly better results than the LEP per sé, nor did it lead to lowered BMI scores. Programme specific findings are discussed separately for each group.

Outcome of the combined Tomatis and LEP in Group 1

Regarding reduction of negative mood states, the large practical reductions of Confusion, and trends towards lowered Tension-Anxiety and Fatigue, could be ascribed to possible interaction between the anxiety reducing effect of the Tomatis stimulation (Madaule, 1994; Tomatis, 1991) and the impact of rational, focussed discussions in the psychological aspects of the LEP. It could also be argued that the consistent “message” concerning various aspects of healthy lifestyle, i.e. life skills, information on healthy eating and the physical

exercise programme, would inevitably enhance clarity and reduce confusion. These developments possibly paved the way for self-concept enhancement, since large practical improvements in self-concept occurred, specifically involving Physical Self, Moral-Ethical Self, Personal Self and Family Self. Improved Physical Self suggested an enhanced perception of participants' bodies, state of health, physical appearance, skills and even sexuality. Further confirmation came from concomitant behavioural changes, ranging from increased comfort with nudity when taking a bath; the ability to physically touch others as a way of expressing positive emotions and statements about feeling better about their bodies. Body dissatisfaction and by implication, poor sense of physical self, have consistently been linked to weight and appearance issues (Cullari & Rohrer, 1998; Davis et al., 2001; McConnell & Swan, 2000) and thus lent credence to improvement in this area.

Improved body posture is a known effect of the TM, on account of the stimulation of the vestibular system in the inner ear leading to improved body image, the underlying basis of self-image (Madaule, 1994; Tomatis, 1991). However, given the consistent inputs in the LEP aimed at improving self-image, this result reflected interactions between both.

Improved Personal Self implied an enhanced sense of personal worth, feelings of adequacy and self-evaluation, irrespective of appearance or relationships to others. In this regard one participant found it easier to remember people's names. Family Self improvements suggested enhancement of participants' sense of value and worth as family members - a worthy gain since many experienced intense conflicts in family contexts. In terms of the negative effects of being overweight, i.e. emotional distress, lack of self-confidence and disparagement of body image (Allan, 1998; Brink et al., 1997; Laliberté et al., 1999; Oates-Johnson & De Courville, 1999; Sarwer et al., 1998), these findings confirmed encouraging improvement of self-perceptions. Again, results could be attributed to the entire LEP.

On top of these positive quantitative outcomes, developments concerning two participants warrant brief comments. The eldest Group 1 member (A), married, already having a degree and furthering her studies, participated highly constructively. Towards the end of the programme she reported learning so much about herself that she also opted to attend individual therapy with a private practitioner. Another, (B) requested more Tomatis sessions after

programme completion, on account of discovering she could actually touch others physically and felt so much better about herself. Although not part of the study anymore, her elective extended listening culminated in disclosing a history of perinatal complications, i.e. a prolonged labour, possibly associated with her long-standing conflict about growing up, an issue finally settled with her mother in a conjoint session. Viewed psychodynamically, this metaphoric "weight" had to be discarded before body weight can be reduced significantly. Both cases illustrated the complex dynamics of being overweight, as well as the possible link between maturity level and inner locus of control/motivation for personal growth. Additionally B's extended listening suggested that more than 60 sessions are essential to achieve optimal results with the TM in overweight individuals.

Unchanged BMI scores might be linked with three factors. Firstly self-concept enhancement as in case of B seemingly eliminated the initial desire for weight reduction. Secondly, assessment limitations, associated with BMI measurement, might also account for the lack of weight reduction. In the aftermath of the project it became evident that measurement of fat percentage and muscle mass would perhaps render more accurate assessments of possible weight reduction

(Clifford et al., 1991; Heyward, 2002). Apparently it is common for lean, healthy athletes to present with elevated BMI's. Hence, when commencing an exercise programme, weight may increase due to increased muscle mass, which is perceived as desirable (Ball et al., 2001). Lastly only 30% members exercised regularly and thus limited perseverance associated with being overweight was evident.

Enhanced psychological well-being in both groups 1 and 2 is another positive outcome, possibly also associated with reduction of negative mood states as well as self-concept enhancement. It confirmed earlier findings with depressed young adults (Coetzee, 2001) in whom reduced depression was associated with increased purpose in life scores, another indication of psychological well-being.

Outcome of the Lifestyle enhancement program in Group 2

Similar to Vermeulen's (2002) study, the LEP on its own, resulted in surprisingly positive results, confirming the value of a psychologically based intervention, complemented by physical exercise, dietary and clothing inputs. It led to a significant reduction of Confusion on the POMS as well as tendencies towards reduction of Depression and Fatigue. Self-concept improvement in terms of large practical increases in Physical Self, indicative of improved body

perception and Personal Self, occurred. Psychological well-being too improved significantly.

Subscales of the TSCS confirmed that participants improved in terms of Physical Self, i.e. indicated improved body perception, and Personal Self, suggesting improved self-esteem and hence better interpersonal communication. It could possibly be attributed to the emphasis on conflict and stress management. Again it has to be noted that improved self-concept was probably also related to the large practical increase in psychological well-being, as evidenced on the Sense of Coherence scale. Individuals with a higher sense of coherence are more likely to have a positive self-esteem, have more control over their situation and a positive outlook on life, thus reducing detrimental effects on family adaptation, health and well-being (Antonovsky, 1988; Pallant & Lae, 2002).

Similar to Group 1, the dietetic inputs were received with considerable discussion. Although students claimed time constraints as reason for irregular exercise, it was probably a reflection of poor motivation associated with being overweight (Annesi, 2000; Harris et al., 1999; Senekal et al., 2002).

CONCLUSIONS

The multidisciplinary approach to overweight female students had been partially effective, since the psychological efficacy of both the LEP and a combination of LEP and TM were confirmed, in terms of reduced negative mood states and enhancement of aspects of self-concept and psychological well-being. Thus it was concluded that the multidisciplinary intervention was associated with important results on a psychological level, which might ultimately also effect reduced weight.

Given the poor motivation associated with eating disorders and predictably overweight too, high risks of attrition could be expected. Thus it was concluded that the diverse interventions managed to capture the attention of the overweight students to such an extent that only one Group 3 member deserted and one Group 1 member's participation was terminated for reasons mentioned earlier.

The richness of the data emerging from encounters with participants, highlighted a number of hypotheses about being an overweight female student, i.e.:

- (i) a symptom of underlying psychological issues;

- (ii) an indirect outcome of perinatal complications associated with weight issues.

Various hypotheses concerning therapeutic interventions also arose, i.e.:

- (i) if psychological growth is initiated in overweight participants, the initial desire for weight reduction might recede (e.g. B); and
- (ii) unresolved ambivalence, e.g. conflicting attitudes about engaging in life or not might jeopardize any therapeutic interventions, despite their relevance.

It was thus concluded that both the complexity and multifactorial nature of overweight in the study group was underestimated and sole identification on the basis of BMI scores was insufficient.

The impact of the Tomatis Method per sé has not been adequately clarified, because of the time constraints in the current project. The fact that two Group 1 participants resolved to attend further interventions over and above the LEP, suggested that the “opening up” impact of sound stimulation needs further evaluation in research contexts with overweight females, to delineate its optimal contribution to this domain of sub-clinical eating disorders.

Limitations of the study

The multidisciplinary nature of the LEP implied that components had to be aligned with schedules of professionals and postgraduate students in relevant disciplines. Since critical cut-off dates were not negotiated consistently, valuable time was forfeited, and further compromised by term tests and mid year examinations.

Responsivity to participants' needs in both groups implied deviating from the manualized structure of the LEP, during session 5, possibly jeopardizing the integrity of the treatment programme, although admittedly it fostered group cohesion, especially in Group 1 and permitted exploration at deeper levels of intrapersonal functioning.

Failure to effect reduced BMI scores highlighted the chief limitation of both programmes, i.e. brevity, especially concerning the duration and intensity of the physical exercise component, as well as the means of measurement (BMI), in view of the subsequent recommendation about an alternative indication of body composition. It was thus concluded that optimal results would only be attainable provided time constraints in the current study could be obviated.

Recommendations for further research

- (i) Rigorous scrutiny of prospective candidates to ensure comparability on developmental, biochemical and psychological level;
- (ii) structuring the psychological components of the therapeutic programme according to these characteristics;
- (iii) careful sequencing of interventions to fit in with participants' activities and rationale underlying programme components;
- (iv) selecting either older age groups, i.e. ladies between 24-35, or teenagers (11-17);
- (v) contracting for a more intensive programme and allowing space for integration, further intervention, assessment and follow-up to assess retention effects; and
- (vi) an integration of qualitative and quantitative methodologies to render richer and more meaningful results.

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Appendix A, Table 1: Biographical information regarding Groups 1, 2 and 3

Variable		Group 1	Group 2	Group 3
		(n = 10)	(n = 10)	(n = 9)
Age	19-22	8	10	10
	25-30	2	0	0
Home Language	Afrikaans	10	10	9
Marital Status	Single	9	10	9
	Married	1	0	0
Attempted Appetite Suppressants Previously	Yes	9	5	4
	No	1	5	5
Attempted Previous Diets	Yes	9	6	4
	No	1	4	5
Chronicity of Overweight	4-5 years	4-5 years	4-5 years	

Appendix B, Table 2: Significant pre-assessment differences among groups (N = 29)

Variable	Group 1 (n = 10) Mean	Group 2 (n = 10) Mean	Group 3 (n = 9) Mean	Root MSE	ANOVA p-value	KRUSKAL- WALLIS p-value
BMI (kg/m ²)	26.027	24.070	23.344	3.125	0.153	0.255
SOC	140.400	132.900	127.111	22.602	0.448	0.493
POMS						
TEN	12.400	8.000	12.111	6.049	0.215	0.349
DEP	16.900	19.900	21.778	12.437	0.691	0.767
ANG	12.900	12.700	13.778	7.747	0.950	0.970
VIG	17.000	14.700	16.111	6.531	0.733	0.767
FAT	13.600	11.100	13.667	6.780	0.638	0.701
CON	6.100	6.900	8.111	5.279	0.710	0.561
TSCS						
PHS	57.300	60.500	60.111	6.385	0.487	0.421
MES	5.332	3.778	-0.790	5.858	0.094	0.067*
PS	62.900	63.600	62.889	7.928	0.974	0.996
FS	69.100	71.900	67.111	9.423	0.545	0.460
SS	70.200	69.900	63.444	8.253	0.157	0.219

Note. *: Co-variance adjustment; **p-value:** Statistical significance, ANOVA; **d-value:** Practical significance; **Root MSE:** Root Mean Square Error; **BMI:** Body Mass Index; **SOC:** Sense of Coherence Scale; **POMS:** Profile of Mood States; **TEN:** Tension-Anxiety; **DEP:** Depression-Dejection; **ANG:** Anger-Hostility; **VIG:** Vigor; **FAT:** Fatigue; **CON:** Confusion-Bewilderment; **TSCS:** Tennessee Self-Concept Scale; **PHS:** Physical Self; **MES:** Moral-Ethical Self; **PS:** Personal Self; **FS:** Family Self; **SS:** Social Self; **d 1,2:** Comparison between group 1 and 2; **d 1,3:** Comparison between group 1 and 3; **d 2,3:** Comparison between group 2 and 3.

* p ≤ 0.05

** p ≤ 0.01

*** p ≤ 0.001

⊙ d ≥ 0.2 (small effect)

⊙⊙ d ≥ 0.5 (medium effect)

⊙⊙⊙ d ≥ 0.8 (large effect)

Appendix C, Table 3: Significant pre-post differences within group 1 (Tomatis - N = 10)

Variable	M-Diff	Standard Deviation	Paired t-test p-values	Signed Rank p-values	Effect size d-values
BMI	0.531	1.599	0.379	0.438	
SOC	11.300	10.678	**0.009	*0.012	1.058⊙⊙⊙
POMS					
TEN	-4.400	5.680	*0.037	*0.043	0.775⊙⊙⊙
DEP	-5.200	11.821	0.198	0.232	
ANG	-5.000	6.446	0.366	0.041	
VIG	3.500	5.583	0.079	0.070	0.627⊙⊙
FAT	-4.300	5.417	*0.033	*0.039	0.794⊙⊙
CON	-4.100	4.175	*0.013	**0.004	0.982⊙⊙⊙
TSCS					
PHS	6.700	6.667	*0.011	*0.020	1.005⊙⊙⊙
MES	5.600	7.137	*0.035	0.059	0.785⊙⊙
PS	9.100	7.310	**0.003	**0.004	1.245⊙⊙⊙
FS	6.800	7.208	*0.015	*0.029	0.943⊙⊙⊙
SS	3.700	6.325	0.097	*0.047	0.585⊙⊙

Note. *: Co-variance adjustment; **p-value:** Statistical significance, ANOVA; **d-value:** Practical significance; **Root MSE:** Root Mean Square Error; **BMI:** Body Mass Index; **SOC:** Sense of Coherence Scale; **POMS:** Profile of Mood States; **TEN:** Tension-Anxiety; **DEP:** Depression-Dejection; **ANG:** Anger-Hostility; **VIG:** Vigor; **FAT:** Fatigue; **CON:** Confusion-Bewilderment; **TSCS:** Tennessee Self-Concept Scale; **PHS:** Physical Self; **MES:** Moral-Ethical Self; **PS:** Personal Self; **FS:** Family Self; **SS:** Social Self; **d 1,2:** Comparison between group 1 and 2; **d 1,3:** Comparison between group 1 and 3; **d 2,3:** Comparison between group 2 and 3.

* p ≤ 0.05

** p ≤ 0.01

*** p ≤ 0.001

⊙ d ≥ 0.2 (small effect)

⊙⊙ d ≥ 0.5 (medium effect)

⊙⊙⊙ d ≥ 0.8 (large effect)

Appendix D, Table 4: Significant pre-post differences within group 2 (LEP - $N = 10$)

Variable	M-Diff	Standard Deviation	Paired t-test p-values	Signed Rank p-values	Effect size d-values
BMI	0.171	1.134	0.703	0.844	
SOC	11.200	8.929	**0.003	**0.004	1.254⊙⊙⊙
POMS					
TEN	-1.800	4.290	0.217	0.250	
DEP	-8.400	11.909	0.053	0.055	-0.705⊙⊙
ANG	-3.000	9.787	0.358	0.387	
VIG	5.300	5.229	*0.011	*0.016	1.014⊙⊙⊙
FAT	-4.000	5.395	*0.044	0.063	-0.741⊙⊙
CON	-4.200	5.613	*0.042	0.047	-0.748⊙⊙
TSCS					
PHS	5.200	4.290	**0.004	**0.006	1.212⊙⊙⊙
MES	3.000	5.375	0.111	0.125	
PS	5.800	6.647	*0.022	*0.037	0.873⊙⊙⊙
FS	1.600	5.038	0.341	0.295	
SS	-0.600	5.758	0.749	0.842	

Note. *: Co-variance adjustment; **p-value:** Statistical significance, ANOVA; **d-value:** Practical significance; **Root MSE:** Root Mean Square Error; **BMI:** Body Mass Index; **SOC:** Sense of Coherence Scale; **POMS:** Profile of Mood States; **TEN:** Tension-Anxiety; **DEP:** Depression-Dejection; **ANG:** Anger-Hostility; **VIG:** Vigor; **FAT:** Fatigue; **CON:** Confusion-Bewilderment; **TSCS:** Tennessee Self-Concept Scale; **PHS:** Physical Self; **MES:** Moral-Ethical Self; **PS:** Personal Self; **FS:** Family Self; **SS:** Social Self; **d 1,2:** Comparison between group 1 and 2; **d 1,3:** Comparison between group 1 and 3; **d 2,3:** Comparison between group 2 and 3.

* $p \leq 0.05$

** $p \leq 0.01$

*** $p \leq 0.001$

⊙ $d \geq 0.2$ (small effect)

⊙⊙ $d \geq 0.5$ (medium effect)

⊙⊙⊙ $d \geq 0.8$ (large effect)

Appendix E, Table 5: Significant pre-post differences within group 3 (Control - N = 9)

Variable	M-Diff	Standard Deviation	Paired t-test p-values	Signed Rank p-values	Effect size d-values
BMI	0.058	0.947	0.869	0.945	
SOC	1.333	12.329	0.754	0.844	
POMS					
TEN	-0.444	6.346	0.839	1.000	
DEP	-1.111	9.993	0.747	0.602	
ANG	3.667	7.937	0.203	0.227	
VIG	-1.000	6.500	0.657	0.645	
FAT	-2.889	6.214	0.201	0.258	
CON	-0.111	5.085	0.949	0.773	
TSCS					
PHS	3.222	5.333	1.81	0.105	
MES	-0.222	5.286	-0.13	0.984	
PS	1.889	3.180	1.78	0.156	
FS	2.444	9.382	0.78	0.445	
SS	1.333	5.635	0.71	0.539	

Note. *: Co-variance adjustment; **p-value:** Statistical significance, ANOVA; **d-value:** Practical significance; **Root MSE:** Root Mean Square Error; **BMI:** Body Mass Index; **SOC:** Sense of Coherence Scale; **POMS:** Profile of Mood States; **TEN:** Tension-Anxiety; **DEP:** Depression-Dejection; **ANG:** Anger-Hostility; **VIG:** Vigor; **FAT:** Fatigue; **CON:** Confusion-Bewilderment; **TSCS:** Tennessee Self-Concept Scale; **PHS:** Physical Self; **MES:** Moral-Ethical Self; **PS:** Personal Self; **FS:** Family Self; **SS:** Social Self; **d 1,2:** Comparison between group 1 and 2; **d 1,3:** Comparison between group 1 and 3; **d 2,3:** Comparison between group 2 and 3.

* $p \leq 0.05$

** $p \leq 0.01$

*** $p \leq 0.001$

⊙ $d \geq 0.2$ (small effect)

⊙⊙ $d \geq 0.5$ (medium effect)

⊙⊙⊙ $d \geq 0.8$ (large effect)

Appendix F, Table 6: Significant post-assessment differences among groups (N = 29)

Variable	Effect size d 1,2	Effect size d 1,3	Effect size d 2,3
BMI			
SOC	0.009	0.934⊙⊙⊙	0.925⊙⊙⊙
POMS			
TEN			
DEP			
ANG	0.082	0.163	0.244⊙⊙
VIG	0.746⊙⊙	0.434⊙	0.312⊙
FAT			
CON			
TSCS			
PHS			
MES			
PS	0.529⊙⊙	1.187⊙⊙⊙	0.659⊙⊙
FS			
SS			

Note. *: Co-variance adjustment; **p-value:** Statistical significance, ANOVA; **d-value:** Practical significance; **Root MSE:** Root Mean Square Error; **BMI:** Body Mass Index; **SOC:** Sense of Coherence Scale; **POMS:** Profile of Mood States; **TEN:** Tension-Anxiety; **DEP:** Depression-Dejection; **ANG:** Anger-Hostility; **VIG:** Vigor; **FAT:** Fatigue; **CON:** Confusion-Bewilderment; **TSCS:** Tennessee Self-Concept Scale; **PHS:** Physical Self; **MES:** Moral-Ethical Self; **PS:** Personal Self; **FS:** Family Self; **SS:** Social Self; **d 1,2:** Comparison between group 1 and 2; **d 1,3:** Comparison between group 1 and 3; **d 2,3:** Comparison between group 2 and 3.

* p ≤ 0.05

** p ≤ 0.01

*** p ≤ 0.001

⊙ d ≥ 0.2 (small effect)

⊙⊙ d ≥ 0.5 (medium effect)

⊙⊙⊙ d ≥ 0.8 (large effect)

Appendix F, Table 6: Significant post-assessment differences among groups (N = 29)

Variable	Group 1 (n = 10) Mean	Group 2 (n = 10) Mean	Group 3 (n = 9) Mean	Root MSE	ANOVA p-value	KRUSKAL WALLIS p-value
BMI	0.531	0.171	0.058	1.263	0.74	0.819
SOC	11.300	11.200	1.333	10.669	0.09	0.200
POMS						
TEN	-4.400	-1.800	-0.444	5.471	0.29	0.326
DEP	-5.200	-8.400	-1.111	11.322	0.39	0.364
ANG	-5.000	-3.000	3.667	8.181	0.08	*0.049
VIG	3.500	5.300	-1.000	5.767	0.07	0.086
FAT	-4.300	-4.000	-2.889	5.667	0.85	0.755
CON	-4.100	-4.200	-0.111	4.990	0.15	0.322
TSCS						
PHS	6.700	5.200	3.222	6.019	0.40	0.383
MES	5.600	3.000	-0.222	6.075	0.13	0.205
PS	9.100	5.889	1.888	7.339	0.051	0.052
FS	6.800	1.600	2.444	5.924	0.26	0.212
SS	3.700	-0.600	1.333	22.060	0.28	0.323