EFFICACY OF ABBREVIATED PROGRESSIVE MUSCLE RELAXATION AND ACTIVE RELAXATION TRAINING ON IMPROVEMENT OF ATTENTIVENESS MEDIATED BY TRANSIENT FEELINGS AND PSYCHOBIOLOGICAL INDICES OF ANXIETY

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LIST OF ABBREVIATIONS

AL	Adaptation Level
ANOVA	Analysis of Variance
APMR	Abbreviated Progressive Muscle Relaxation
AR	Active Relaxation
BAI	Beck Anxiety Inventory
CRT	Complex reaction time
CSAI-2R	Competitive State Anxiety Inventory 2
DASS	Depression Anxiety and Stress Scale
GE	Group Exercise
GSR	Galvanic Skin Resistance
PGR	Psychogalvanic Reflex
PMR	Progressive Muscle Relaxation
PMRT	Progressive Muscle Relaxation Training
RT	Reaction Timer
SA	State-Anxiety
Sc	Skin Conductance
SD	Standard Deviation
SF	Spontaneous Fluctuation
SMI	Stress Management Intervention
SPSS	Statistical Package for Social Sciences
SR	Skin Resistance
SRT	Simple Reaction time
STAI	State-Trait Anxiety Inventory
TA	Trait-Anxiety
USMKK	Universiti Sains Malaysia Kubang Kerian

ABSTRACT

The present study was undertaken with an objective to determine differential efficacy of psychotherapeutic interventions, namely abbreviated progressive muscle relaxation (APMR) exercise training and active relaxation in enhancing attentive capacity in young active female participants. Twenty seven female students of Universiti Sains Malaysia in the age ranging from 18 to 24 years volunteered as participants, who were assessed with dispositional and transient anxiety by employing Spielberger's State and Trait Anxiety Inventory (STAI). Thereafter, they were randomly categorized into three groups; viz. – Group A- control group; Group B – participants received training of APMR and Group C – participants received training of Active relaxation. All of the participants were subjected to evaluation of transient anxiety; both simple and complex reaction ability; psychobiological measures of tonic and phasic skin conductance activity as measure of pre-intervention analyses. Thereafter the participants of intervention conditions were introduced to their respective intervention training programs following standardized protocol (15 minutes/day; 2 days/week for 6 weeks). Mid-term analyses (all of the parameters of pre-intervention analyses were repeated) were done three weeks after the introduction of intervention sessions. Thereafter the similar protocol of intervention was followed for three more weeks. Thereafter all of the participants were assessed once again for the post-intervention analyses (following similar analyses protocols). Findings of the analyses suggested that both APMR and active relaxation intervention had beneficial impacts on attentive performance, characterized by psychomotor simple muscular reaction time and on cognitively dominated complex reaction performance. Furthermore, both of the interventions have been observed to result in alteration in the psychobiological make-up of the participants, which finally resulted in improvements in attentive performances.

ABSTRAK

Kajian ini telah dijalankan dengan objektif untuk menentukan keberkesanan perbezaan intervensi psikoterapi, iaitu latihan senaman singkat relaksasi otot secara progresif (APMR) dan relaksasi aktif dalam meningkatkan tumpuan dalam kalangan peserta perempuan muda dan aktif. Dua puluh tujuh pelajar perempuan Universiti Sains Malaysia dalam lingkungan usia 18 hingga 24 tahun menawarkan diri secara sukarela sebagai peserta, dan dinilai dengan kebimbangan disposisi dan transien dengan menggunakan "State and Trait Anxiety Inventory" (STAI) Spielberger. Selepas itu mereka dikategorikan secara rawak kepada tiga kumpulan, iaitu. - Kumpulan A- kumpulan kawalan; Kumpulan B - peserta menerima latihan APMR dan Kumpulan C - peserta menerima latihan relaksasi aktif. Semua peserta menjalani penilaian kebimbangan transien; kedua-dua keupayaan tindak balas ringkas dan kompleks; mengukur psikobiologikal tonik dan phasic aktiviti konduktan kulit sebagai pengukuran analisis pra-intervensi. Selepas itu peserta intervensi diperkenalkan kepada program latihan intervensi masing-masing dengan mengikuti protokol piawaian (15 minit/ hari, 2 hari / minggu selama 6 minggu). Analisis Pertengahan Intervensi (semua parameter analisis pra-intervensi diulangi) dan dilakukan tiga minggu selepas pengenalan sesi intervensi. Selepas itu protokol intervensi yang sama dilakukan selama tiga minggu lagi. Selepas itu semua peserta dinilai sekali lagi untuk analisis akhir intervensi (yang mengikuti protokol analisis yang sama). Hasil analisis menunjukkan bahawa kedua-dua APMR dan intervensi relaksasi aktif mempunyai kesan positif ke atas prestasi tumpuan, berunsurkan psikomotor masa tindak balas otot ringkas dan kognitif dikuasai prestasi tindak balas kompleks. Tambahan pula, kedua-dua intervensi telah menyebabkan perubahan dalam psikobiologikal peserta, yang akhirnya menyebabkan peningkatan dalam prestasi tumpuan.

CHAPTER I

INTRODUCTION

1.1STUDY BACKGROUND

Psychotherapy is a general term referring to therapeutic interaction or treatment contracted between a trained professional and individual, family, couple, or group. The problems addressed are psychological in nature and can vary in terms of their causes, influences, triggers, and potential resolutions. Psychotherapy aims to increase the individual's sense of his/her own well-being. Psychotherapists employ a range of techniques based on experiential relationship building, dialogue, communication and behavior change that are designed to improve the mental health of the individual, or to improve group relationships (such as in a family).

An intervention is an orchestrated attempt by one or many people – usually family and friends – to get someone to seek professional help with an addiction or some kind of traumatic event or crisis, or other serious problem. The term intervention is most often used when the traumatic event involves addiction to drugs or other items. Intervention can also refer to the act of using a similar technique within a therapy session.

A relaxation technique (also known as relaxation training) is an exercise program, that can help a person to relax; to attain a state of increased calmness; or otherwise reduce levels of anxiety, stress or anger and can decrease muscle tension, lower the blood pressure and slow heart and breath rates, among other health benefits (Goleman, 1986).

1.1.1 ATTENTION

The study of attention has a rich and various stories. Attention which is currently one of the core themes in psychology is viewed as complex multidisciplinary field of study. According to Parasuraman (1998), research in attention is being conducted in many areas of the psychological sciences including cognitive psychology, psychophysiology, neuropsychology and developmental psychology.

In sport context, attention has been suggested by several authors as a vital aspect of athletic performance (Abernethy, 1993; Boutcher, 1990; Moran, 1996). The research examining the role of attention in sport has yet to be developed. Furthermore, few studies have examined the attentional mechanism underpinning athletic performance (Thelma, 2008). It is essential to maintain the focus during competition to achieve optimal performance. If athletes are unable to focus on relevant information and avoid the numerous distractions from surroundings that are a regular part of sport competition, athletes' chance of performing at their highest level and achieving their goals will drop. Despite this importance, focus may be the most misunderstood psychology contributor to performance, and this lack of understanding causes coaches and athletes to use focus in ways that hinder rather than help performance (Jim & Gregory, 2005).

Moran (1996) explored the relationship between attention and sport performance. Jackson and Csikszentmihalyi (1999) stated that "flow is about focus", noting focus is essential to a state of consciousness in which athletes are totally absorbed in the activity they are engaged in.

One factor that may divert attention to unnecessary stimuli is worry. The emotional state of worry suggested by Sarason (1972) and Wine (1971) distracts attention and thus can explain the negative effect of test anxiety on performance.

Anxious people normally focus their attention on task-irrelevant thoughts and critical task cues are ignored during testing which is suggested by Sarason (1972) and Wine (1971). Therefore, people who attend too much to negative thoughts are not focusing their attention on task-relevant cues and will not produced performance results that reflect their ability. On the other side, in non-stimulating and low arousal environment, athlete might miss the important task-relevant cues due to lack of intensity in attention (Thelma, 2008).

Typical cognitive stress reactions are reductions in the ability to focus, think properly, or remember accurately (Beilock & Carr, 2005; Cavenett & Nixon, 2006; Liston, McEwen & Casey, 2009; Morgan et al., 2006). Above mentioned problems appear partly because of deep thinking, the repeated intrusion of thoughts about stressful events (Lyubomirsky & Nolen-Hoeksema, 1995). These deep thoughts are known as ruminative thoughts such as relationship problems; can seriously interfere with the study.

1.1.2 PSYCHOTHERAPEUTIC INTERVENTIONS

Relaxation, which is opposite to neuromuscular hypertension, is a physical state which may be affected by mental or emotional stress. It is learned through a process of tensing and voluntarily relaxing the major muscle groups of the body (Silva and Weinberg, 1984). Rosa (1976) describes the relaxed state as total physical immobility and relaxation of the skeletal muscle with a regulating effect on the sympathetic nervous system. This is accompanied by a feeling of diminished consciousness of the external world, drowsiness, passitivity and focusing of attention on feelings of internal well-being. Burns (1981) listed a number of advantages of relaxation training. These include:

1) Stress related problems such as hypertension, tension headache, insomnia etc. may be eliminated or ameliorated.
2) Overall improvement in performance of vocational, social and physical skills may occur as a result of reduced tension levels.
3) Relaxation can be aid to recovery certain illness and surgery.
4) An important psychological consequence of relaxation is that the individual's level of self-esteem and self-assurance is likely to be increased as a result of much improved control of stress reactions.

As for this research, we will only focus on two types of relaxation trainings that are progressive relaxation and active or meditative relaxation. Edmund Jacobson, who was a Chicago physician, is the pioneer of progressive muscle relaxation (PMR) technique in 1938. The basic principle employed by the technique is the alternate tensing and relaxing of the major muscle groups in the body with focussed attention being applied to the sensation of tension and the different sensation of relaxation (Iso-Ahola and Hatfienld, 1986). In PMR, each major muscle group is systematically contracted in turn, so that the learner can identify the unique tension sensation for that muscle group and then the tension is released to achieve a state of relaxation (McGuigan, 1984). Jacobson (1938) asserted that, this form of muscle relaxation requires no imagination, will power and suggestion which make it easy technique to learn. He based his work on the premise that the body responds to anxiety provoking thoughts and events with muscle tension and this physiological tension increases an individual's subjective experience of anxiety.

Though Jacobson's early form of progressive relaxation was effective, a major limitation was the amount of time- often many months are required for its accomplishment. Thus, the modified form of PMR was developed that have made it

relatively easy to master. With most people, PMR seems to be one of the more effective means of achieving muscle relaxation. Thus, it is used quite widely either directly or adjunctively as a therapeutic intervention technique (Wenrich, 1982).

From the time of Jacobson (1938), it has been demonstrated that relaxation diminishes blood pressure, pulse rate and make respiratory rate smoother and slower (Wolpe, 1969). Wolpe (1958) has emphasized the autonomic inhibitory effects of relaxation resulting directly in the lowering of muscle tension and indirectly in the reduction of autonomic activity.

The positive effect of relaxation training was observed by Dehghan-Nayeri and Adib-Hajbaghery (2011), Wachelka and Katz (1999), Rausch et al. (2006), Pan et al. (2012) and Yildirim and Fadiloglu (2006). Literature survey reveals the inconclusive findings regarding anxiety- PMR relationship. The inhibitory effect was found by Wolframm and Micklewright (2011) and Lolak et al. (2008). Furthermore, Urech et al. (2010), Keogh et al. (2006) and Robb (2000) showed no relationship between PMR and anxiety amelioration. In treating anxiety and tension relaxation as a therapeutic technique has been found to be quite useful. Beach (1969) pointed out that relaxation therapy gives a feedback from the musculature which enables the patient to differentiate states of muscular tension and relaxation and that he may subsequently achieve a voluntary control over tension.

Meanwhile, active relaxation is a type of relaxation that requires a person to actively involve in relaxation techniques such as stretching, yoga, breathing exercise and others. Autogenic training is also part of active relaxation. It was originally developed in Germany in 1920s by Schultz and Luthe and has been quite popular in Europe. The basic form of autogenic training consists of six standard exercises

composed of a combination of relaxation and self-suggestion techniques. Assign to the cultivation of sensations of heaviness in the limbs (muscular relaxation) is the first exercise, second to sensations of warmth (peripheral dilation), the third to reduction of heart rate, the fourth to development of a smooth regular pattern of respiration, the fifth to visceral regulation with emphasis on cultivating warmth in solar plexus and the sixth to cooling the forehead. These series of exercises is designed to produce deep relaxation and restore homeostasis in the body for "Other Relaxation Techniques" (Donna, 1986).

Breathing is an autonomic body function, controlled by the respiratory centre of the brain. However, we can also deliberately change our rate of breathing. Different healing systems, from different cultures, have long realised the healing benefits of the breath, including yoga, taichi and some forms of meditation. Regardless of the philosophy, scientific studies have shown that correct breathing can help manage stress-related conditions by soothing the autonomic nervous system. Breathing exercise is also one of the most common methods used by researchers as their intervention program along with other relaxation training to investigate on psychological problems.

The positive effect of breathing exercise on attention was observed by Lord et al. (2003) and William and Lord (1997) while contrasting result showed by Barnett et al. (2003). Meanwhile, the relationship of breathing exercise and anxiety amelioration was investigated and some (Galvin et al., 2006 and William and Lord, 1997) revealed positive findings while Wolframm and Micklewright (2011) showed a contrast result.

1.2 SIGNIFICANCE OF THE STUDY

In present society stress is mostly obvious in every sphere of life endeavour. Cognitive demands to meet the academic achievement targets put youth under immense emotional turmoil, increased life-stress, anxiety, insomnia, autonomic crises and

eventually psychological breakdown. This study will focus on the evaluation of psychological as well as psychobiological factors to identify cognitive-emotional pathways related to psychobiological crises and the concomitant disruptive emotionality problem and the related attentional crises. Furthermore the present study will focus on the use of psychotherapeutic interventions such as PMR and active relaxation t enhance emotional regulation and improve attentive performance.

1.3 OBJECTIVES OF THE STUDY

1.3.1 GENERAL OBJECTIVES

To study the effect of Abbreviated Progressive Muscle Relaxation (APMR) on attentiveness in young adult participants.

1.3.2 SPECIFIC OBJECTIVES

a) To find out the effect of Abbreviated Progressive Muscle Relaxation (APMR) on the level of anxiety in the participants.

b) To assess the effect of APMR onto the attentive capacity of the young adult individuals.

c) To see whether the effect of APMR as could be revealed through physiological measures would be corollary to that to be noted in the subjective experience of anxiety and attentive performance in the young participants.

1.4 RESEARCH HYPOTHESIS

1. **Null hypothesis**, Ho: No significant change in the level of anxiety as outcome of Abbreviated Progressive Muscle Relaxation (APMR) training.

   Alternative hypothesis, H_A: Significant change in the level of anxiety as outcome of Abbreviated Progressive Muscle Relaxation (APMR) training.

2. **Null hypothesis**, Ho: No significant change in the level of attentive performance as outcome of Abbreviated Progressive Muscle Relaxation (APMR) training.

   Alternative hypothesis, H_A: Significant change in the level of attentive performance as outcome of Abbreviated Progressive Muscle Relaxation (APMR) training.

3. **Null hypothesis**, Ho: No significant effect of APMR as could be revealed through psychophysiological measures would be corollary to that to be noted in the subjective experience of anxiety and attentive performance in the young participants.

   Alternative hypothesis, H_A: Significant effect of APMR as could be revealed through psychophysiological measures would be corollary to that to be noted in the subjective experience of anxiety and attentive performance in the young participants.

CHAPTER II

LITERATURE REVIEW

The survey of literature gives an impression that the studies conducted in this area may broadly be divided into – 1) those concerned to see the effects of relaxation training on psychological variables, and 2) those concerned to see the effects of relaxation training on psychophysiological variables. Studies conducted with regard to psychological variables were designed to investigate the effects of Relaxation Exercise on Attention. Similarly, studies on psychophysiological variables concentrated mainly on Relaxation Exercise and Skin Conductance and Relaxation Exercise on Reaction Time.

This particular review will concentrate only on the effects of relaxation exercise on attention which could be revealed through different psychological and psychophysiological measures, viz.- Skin Conductance (Sc) and Reaction Time (RT). Most pertinent and relevant literatures will be sub-summed here critically but less important studies will not be discussed in detailed due to space limitation and that does not mean those are insignificant.

1. EFFECTS OF ABBREVIATED PROGRESSIVE MUSCLE RELAXATION (APMR) TRAINING ON ATTENTION

A thorough scrutiny of literatures in relation to muscle –relaxation and attentional performance reveals that a sense of inner calm being induced by muscle-relaxation activity culminates a sense of time being slowed down and in consequence ensures a high degree of concentration.

Leite et al. (2010) studying with 42 volunteers on the relationship between Progressive Self-Focus Meditation on attention, anxiety and depression concluded that, significant reduction in scores on depression and an increase in attention found in meditation group compare to control group.

Chambers et al. (2008) on the other hand, investigating with a smaller sample (20 novice mediators) on the relationship of intensive mindfulness meditation training on attentional control, cognitive style and affect. Results reported that those who completed mindfulness training showed significant improvements in self-reported mindfulness, depressive symptoms, rumination and performance measures of working memory and sustained attention compared to group who did not undergo any meditation training.

Scrutiny of reported literatures although reveals positive impact of relaxation on attentional performances, certain methodological disparities raise questions about the said relationship. For example, intervention duration of 5 weeks were investigated by some (Galvin et al., 2006 and Leite et al., 2010), while others investigated for only five days (20 min per session) by Tang et al. (2007) and ten days (intensive) by Chambers et al. (2008). Besides that, meditation practices were employed as relaxation activity by some (Leite et al., 2010; Chambers et al., 2008; Tang et al., 2007; and Galvin et al., 2006) compared to taichi/ yoga suggested by others (Field et al., 2013).

An eye opening relaxation training named Shaolin Dan Tian Breathing (DTB) (Chan et al., 2011) could also foster relaxed and attentive mind like meditation and taichi/ yoga. This study dealt with 42 participants for a month with intervention of 15 minutes per day. Results concluded that encouraging evidence on positive neuro-physiological effects of Shaolin DTB after one month training as it could also induce relaxation and attentiveness.

Review of literatures gives an impression that researchers have been remarkably less concerned about the impact of Progressive Muscle Relaxation (PMR) onto attentional function. Attention is the basic phenomenon of cognitive function. Any improvement in emotional and social spheres of life adjustment must be based on improvement in attentional set. Obviously, lack of concern of the researchers to establish impact of PMR on attention is a serious lack in psychological research. This however may be taken as a pointer for further research.

2. ABBREVIATED PROGRESSIVE MUSCLE RELAXATION (APMR) TRAINING AND ANXIETY AMELIORATION

Survey of literatures gives an impression that anxiety-APMR relationship has been remaining inconclusive as yet. Beneficial effects i.e., reduction of anxiety following relaxation activities (eg., Dehghan-Nayeri and Adib-Hajbaghery, 2011; Wachelka and Katz, 1999; Rausch et al., 2006; Pan et al., 2012; and Yildirim and Fadiloglu, 2006), inhibiting effect (Wolframm and Micklewright, 2011 and Lolak et al., 2008), and even no-relationship between APMR and anxiety amelioration (Urech et al., 2010; Keogh et al., 2006 and Robb, 2000) has been found.

Previous research reports, however, dealt largely with subjective measures only (e.g., Dehghan-Nayeri and Adib-Hajbaghery, 2011; Wolframm and Micklewright, 2011; and Urech et al., 2010) and that would cause difficulty in participants in expression of their feelings on the questionnaire items. Such problem could be avoided by employing objective physiological measures that would enable the experimenter to assess anxiety indirectly avoiding the problems arising from the participant's verbatim reports. However, recent studies incorporated physiological measures solely, as an index of anxiety is rare. Present review will dealt extensively with these studies which

incorporated both subjective and objective physiological measures in assessing anxiety (Chen et al., 2009 and Lehrer et al., 1983).

Chen et al. (2009) conducted a study with 18 patients diagnosed with schizophrenia. Participants were randomly divided into two groups, viz. control group (N=6) ie. no intervention and experimental group (N=8) received Progressive Muscle Relaxation (PMR) for 25 minutes per day for 11 days consecutively with one week of follow up. Drop out rates were 11% in experimental group. Baseline finger temperature was recorded in each session for each person. During baseline procedure, finger temperature was continuously recorded for five minutes allowing subjects to stabilise. First two minutes discounted and remaining three minutes were averaged and obtained as baseline levels and continuously measured in the two groups and recorded changes in finger temperature during and after the Progressive Muscle Relaxation Training (PMRT) session for 40 minutes. Similarly, subjective experiences of anxiety were evaluated before and after treatment using the Beck Anxiety Inventory (BAI) (Beck et al. 1988, Fydrich et al. 1992). Results, however, showed mean increase in finger temperature was significantly greater in the experimental group rather than in control group. Again, changes in anxiety level in experimental group, as revealed through BAI, was found at par with that of objective assessment. Thus, PMR is effective in alleviating anxiety in schizophrenia patients. On the other hand, Lehrer et al. (1983) achieved similar result by having PMR better than meditation on anxious participants but using IPAT Anxiety Inventory and SCL-90R, forearm EMG and State-Trait Anxiety Inventory (STAI) (Spielberger et al., 1970).

Coming to those studies that dealt with subjective self-reports only –Keogh et al. (2006), compared the effect of Stress Management Intervention (SMI) that include Progressive Muscle Relaxation Training (PMRT) as one of the interventions on

academic performance and mental health assessed by Revised Test Anxiety Scale (Benson and Bandalos, 1992). Post-intervention assessment (after ten weeks) however, revealed that only once a week for ten weeks (one hour per session) did not affect test anxiety levels on their participants (N= 160, ,mean age= 15.57 years). However, a previous study by Dehghan-Nayeri and Adib-Hajbaghery (2011), investigating with students, revealed a sustainable reduction in STAI following relaxation training for eight weeks for about 30 minutes each session. Another research that achieved positive findings by using students as participants is research done by Rausch et al. (2006) with as short as a day intervention duration that lasted about 30 minutes for each. Anxiety was tested by using STAI and concluded that effectiveness of brief group training in meditation or PMR can reduce state anxiety stressors. Thus, failure of Keogh et al. (2006), in ensuring anxiety amelioration was formed to be contradicted by Dehghan-Nayeri and Adib-Hajbaghery (2011) and Rausch et al. (2006).

Hence, contradictions were observed to exist between studies discussed so far, and invite critical discussion concerning certain methodological discrepancies. For example, the studies were observed to differ with respect to the sample size investigated; as few as 39 participants (Urech et al., 2010) were investigated in one study, whereas 90 participants (Pan et al., 2012) were investigated in another on pregnancy.

Similarly, age of the participants were observed to vary from 15-16 years in one study (Keogh et al., 2006), 17- 52 years (Wachelka and Katz, 1999) in another and even up to 59-70 years in some others (eg., Lolak et al., 2008). Such a wide range of variation in age of the participants particularly in the latter studies might have seriously affected the homogeneity of the participants investigated.

Another point of disagreement was noted with regard to the nature of participants chosen. For example, students were chosen by some (Rausch et al., 2006; Dehghan-Nayeri and Adib-Hajbaghery, 2011; Keogh et al., 2006; Wachelka and Katz, 1999 and Robb, 2000), whilst pregnant women by others (Urech et al., 2010 and Pan et al., 2012) and athletes by some other researchers (Wolframm and Micklewright, 2011).

Type of intervention incorporated, i.e., the types of relaxation activity exposed in different studies varied largely. For example, PMR along with simple relaxation and combined was used by Dehghan-Nayeri and Adib-Hajbaghery (2011), while relaxation technique (deep breathing and PMR) combined with goal setting, self-talk, imagery and concentrate training was used by Wolframm and Micklewright (2011). Moreover, only PMR was used by Yildirim and Fadiloglu, 2006; Pan et al., 2012; Lolak et al., 2008 and Chen et al., 2009). Robb (2000) combined PMR with music.

Again, discrepancies noted in the duration of relaxation sessions considered by the researchers as adequate. For example, Pan et al. (2012) exposed their participants for as minimum as 3 days (twice 30 minutes per day), whereas Yildirim and Fadiloglu (2006) incorporated only 6 weeks PMRT on their participants. Rausch et al. (2006) on the other hand, exposed their participants to PMR and meditation for only 30 minutes (1 day intervention).

In sum, studies dealing extensively with PMR in relation to anxiety amelioration assessed by corroborative subjective and objective measures, till dates are fewer in number. Further studies with well-controlled methodology are required to overcome existing contradictions of the reported research, as well as to have a clear idea about effect of PMR in reducing anxiety.

3. EFFECTS OF ACTIVE RELAXATION ON ATTENTION

Though studies using Progressive Muscle Relaxation (PMR) training as potential intervention in alleviation psychological problems are many, studies pertaining to the role of active relaxation (eg., breathing exercise) in inducing changes in psychological problems are still insufficient.

Lord et al. (2003) studying with half a thousands of retired adults who are staying in villages, on the relationship between group exercise on physical functioning and concluded that, Group Exercise (GE) group performed significantly better in simple reaction time. The intervention programs included muscle relaxation, controlled breathing and guided imagery during the cool down period for GE group. On the other hand, control group received controlled rhythmical breathing as part of their intervention but only experimental group achieved positive results from intervention. Both groups intervention programs were combines with other types of physical exercises.

William and Lord (1997) investigated on 187 older women adults as their participants. Similarly with Lord et al. (2003), intervention duration was 12 months (2 days/ week, 1 hour/session). William and Lord incorporated muscle relaxation, concentrate on specific body areas, controlled breathing and guided imagery in their exercise programs for elderly in exercise group. Visual reaction time was used to indicate RT and result showed that exercisers show significant improvement in reaction time.

Scrutiny of reported literatures gave a contrast result compare to first two studies mentioned above. Barnett et al. (2003) carried out almost the same intervention program

with Lordet al. (2003) and William and Lord (1997), given that the intervention program of relaxation is slightly reduced (incorporated relaxation training and controlled breathing only in experimental group). Visual reaction time used to measure simple reaction time revealed that groups did not differ at retest in RT. Thus, failure of Barnett et al. (2003) in ensuring amelioration of reaction time was formed to be contradicted by Lord et al. (2003); and William and Lord (1997).

Review of literatures gives an impression that researchers have been remarkably less concerned about the impact of breathing exercise onto attentional function. Since breathing is something that we can control and regulate, it is a useful tool for achieving a relaxed and clear state of mind. Obviously, researchers' lack of concern to establish the effect of breathing exercise on attention is a serious lack in psychological research.

4. ACTIVE RELAXATION AND ANXIETY AMELIORATION

Besides using PMR to ameliorate anxiety, there are actually many more ways or method that can be used. The alternative intervention that can be incorporated in future research is by using active relaxation that focuses more on breathing exercise; as researchers in past studies (eg., Galvin et al., 2006; Wolframm and Micklewright, 2011; and William and Lord, 1997) paid less attention to. The present review will discussed more on these three past researches.

Galvin et al. (2006) incorporated meditation, PMR, guided imagery (GI), biofeedback, hypnosis, deep breathing exercise, autogenic training, Taichi, Qigong and yoga as their intervention programs on 15 adults. Digit Symbol Test, Trail Making Test B are used to measure complex reaction time while Trail Making Test A is used to

measure simple attention/ psychomotor task. Results revealed that reaction time on simple reaction/ psychomotor task was significantly improved meanwhile no significant group differences in complex attention task.

On the other hand, Wolframm and Micklewright (2011) dealt with 10 horse riders from four amateur levels incorporated goal setting, relaxation technique (deep breathing and PMR), self-talk, concentration training and imagery. Results reported no change in intensities of anxiety following sport psychological intervention by using Competitive State Anxiety Inventory 2 (CSAI-2R) (Cox et al., 2003).

Again, survey of literature for effects of breathing exercise on anxiety led back to researches done by William and Lord (1997) who uses Depression Anxiety and Stress Scale (DASS) to measure depression, anxiety or stress in participants. Reported result was anxiety had been reduced in exercisers. The only difference this study compare to first two studies mentioned above was they incorporated relaxation training (minor) into physical exercises (major) as their intervention program. Thus, we do not know whether the effect on anxiety comes from exercise or relaxation training or both.

As we can see, different studies revealed different kinds of results and this gives contradictions to future studies due to methodological discrepancies. However, not much can be compared due to limited literatures that are available. This shows that researchers do not pay much attention to active relaxation, thus this can be a pointer for future studies.

SUMMARY OF THE PREVIOUS LITERATURES

The reviews of literatures just depicted above in this section gives an impression that studies conducted to demonstrate the role of progressive muscle relaxation (PMR) and active relaxation on attentional and anxiety, had been subsumed under the following headings. Only very pertinent studies depicting the role of PMR and active relaxation in amelioration of attention and anxiety have been detailed critically in this review. Main focus of this review is to reveal the present status of our knowledge with regard to the inconsistencies reported in the previous literatures on the subjective measures and objective psychophysiological measures of anxiety subsequent to intervention, namely PMR and active relaxation. In sum, relaxation related studies dealing with corroborative subjective and objective measures of anxiety til date, have not come to a decisive conclusion. Meanwhile, studies related to active relaxation was insufficient and that require researchers in future to take it as a pointer of studies in future.

CHAPTER III

METHODOLOGY

3.1 GENERAL METHODOLOGY

INTRODUCTION:

In this present study, assessment of the existing psychological make-up of the participants was attempted in two ways: subjective experiences of transitory state of anxiety and anxious predisposition and using self-report indices. Objective assessment of attentional performance of the participants and their capacity to regulate autonomic arousal were also done. This was done, particularly for the reason that, the participant might face a little problem in revealing their inner state of psychological crises, accurately enough, through self-report indices. To eradicate this problem it was felt necessary to judge the inner psychobiological status of the participants, indirectly through psychophysiological assessment and reaction time measures. It was postulated that changes in psychological make-up of the participants, as could be revealed through subjective self reports (using structured inventories, viz, State-Trait Anxiety Inventory – STAI); would be corollary to that obtained on the objective physiological assessment viz, Skin Resistance (SR). Apart from that, attentional level of the participants was assessed through Reaction Time (RT) measures. Detailed description of the inventories, objective measures and reaction time measure done are the following.

3.2 SECTION A

3.2.1 THE STATE – TRAIT ANXIETY INVENTORY (STAI)

INTRODUCTION:

This inventory was designed by Spielberger et al., (1970) to provide the reliable means of distinguishing between two distinct aspects of anxiety, viz, State-Anxiety (SA) and Trait-Anxiety (TA). The SA is conceptualised as a transitory level of anxiety, which is often situationally determined and fluctuates with time and circumstances. Whereas the TA is regarded as a relatively stable individual characteristic.

DESIGN AND DEVELOPMENT:

The directions used with the two forms are to ask the participant to indicate how he feels 'right now' (State anxiety) or how he 'generally feels' (Trait anxiety). On the state anxiety parts, the participant was required to respond to each forty items in terms of severity (not at all, some what, moderately so and very much so). On the trait-anxiety part, the participant responded in terms of frequency (almost never, sometimes, often and almost always). In both the forms these categories are assigned numbers from 1 to 4.

ADMINISTRATION AND SCORING:

The scale can be used by individually. However, when using both together, it is recommended that the state anxiety form be administered first (Spielberger et al., 1970). The inventory is self-administered (either individually or in groups). Though there is no time limit, completion of both forms require not more than twenty minutes. In both forms, some of the items are worded in such a way that a response of 1 indicates little anxiety or absence of anxiety and response of 4 indicates high anxiety. Other items are

worded so that a response of 1 would indicate high anxiety. The simplest way to score either scale is to add the rating given to the direct items and reversed items separately and to subtract the sum of the reversed items from the sum of the direct items and to add a constant. If the subject fails to respond to one or more items, a complicated procedure for scoring has been recommended (Spielberger et al., 1970). It should be mentioned here that all the participants used in the present study understood very well the instructions given to them while filling in these forms, and none of them failed to answer any one of these items mentioned in the both forms.

INTERPRETATION:

The score of either form can range from 20 to 80, the higher the score, the greater is the level of anxiety.

3.3 SECTION B

REACTION TIME

INTRODUCTION:

One of the most available response variables for experimental psychology is reaction time. The reason is obvious: every act takes time and time can be measured. We can measure the time occupied in doing a certain amount of work, or we can set a time limit and measure the amount of work done in the given time. In either case we measure the speed of work. Speed is a useful measure in two way : a) as an index of achievement; the more completely one can master a task the more rapidly one can perform it; and b) as an index of the complexity of the inner process by which a result is accomplished; the more complicated the process, the longer time it will take. For such

reasons the timing of responses plays an important role in psychological experimentation. Reaction time is about the simplest case of timing (Woodworth and Scholsberg, 1976).

Reaction time is not the time occupied by the execution of a response. It is the time required to get the overt response started. The reaction time is the S – R time interval. The response cannot come out of the organism quite as soon as the stimulus goes in. The stimulus starts a process going, but the process remains hidden or 'latent' inside the organism till it reaches the muscle and procedures an observable effect on the environment. The sense organ must be aroused to activity, the nerves must conduct to the brain and from the brain to the muscles and the muscles must contract and move some external object. All these process involve a neural delay in information processing. Even in the simplest possible reaction time, nerve impulses coming in from the sense organ have to accumulate and build up enough excitation to arouse the motor areas of the brain and set up a discharge toward the muscles. When the response has to be nicely adjusted to the stimulus, work is done and time is consumed in registering the exact character of the stimulus and organising the motor response. The reaction time, also called the response latency, includes sense organ time, brain time, nerve time and muscle time (Woodworth and Scholsberg, 1976).

The use of reaction time as an index of cognitive performance change due to an exercise conditioning treatment was selected because it reflects a number of CNS conditions theoretically influenced as well by exercise – induced physiological adaptation (Schubert, 1981). (Schubert, 1981; Khan and Khan, 1987) are a few amongst many sport scientists who have directed their efforts toward examining this aspect. Sandhu (1981) found that increased arousal level reflects back in the perceptual activity of the player's leading to various errors. Chattopadhyay (1973) also used R as a CNS

arousal measure. Reaction time is a factor in predicting senility (Ferris et al., 1976), it declines with age (Talland, 1965), and shows in conjunction with an increase in the severity of cardio-vascular disease (Abrahams and Birren, 1973; Birren and Spieth, 1962). In short, reaction time measures provide a broad index of how effectively the CNS is functioning (Marteniuk, 1976).

DESCRIPTION OF THE APPARATUS:

The reaction time of the participants in both visual and auditory modalities was assessed by using 'Udyog Reaction Timer'. This response timer has two different units – a) one gazette used by the experimenter for controlling the experimental procedure and as the timer unit to assess and provide information regarding the time lapsed between stimuli presented and response done (Unit A); and b) one gazette for the participant to respond the stimuli presented by the experimenter (Unit B).

The experimenter's gazette contains one panel board having eight push button switches (six are for corresponding lights and others two are auditory stimulation). At the front part of the gazette, there is a thumb – wheel switch that enables the experimenter to adjust the fore period according to the experimental requirement. The second gazette, i.e. the participant's unit contains a panel – board with six lights (having six different colours), consist of six switches corresponding to each of the lights and other two switches for two different sound modalities. In this gazette also the experimenter can assess the reaction time of the participants. This one is an electronic timer unit that adjusts upto the experimenter's requirement of decimal fractions.

PRECAUTIONS

1) Pilot investigation has been done to determine artefacts, if any, were associates with recording.
2) All recording were taken at approximately the same time of day, i.e. in the morning to avoid the diurnal variation.
3) Room temperature, where the experiment was conducted was favourable.
4) Experiment room was dimly lighted, so that the participant could see the stimulus properly and must be noise free.
5) Premature reactions and other false reactions were avoided.
6) Necessary arrangements were made so that the participant could feel comfortable and relax in the experimental room.
7) Careful attention was given to see whether there existed any preoccupied fear concerning experimental condition, in any of the participants that might potentially contaminate the data.

ANALYSIS OF DATA:

Reaction time was recorded in terms of milliseconds' unit (1/1000 second), 3 trials of simple muscular reaction time were taken in one modality which is visual modality.

INTERPRETATION OF DATA:

The low reaction time score is regarded as an indicator of good cognitive ability. It indicates adequate level of arousal and good attentive capacity.