

## SPECIAL ISSUE

# Differentiating Successful from Less Successful Males and Females in a Group Relaxation/Biofeedback Stress Management Program

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*Managing stress in the post-COVID world requires a program that can efficaciously and cost-effectively address a large number of people who have differing experiences and needs and can also be adapted for internet presentation. The purpose of this paper is to share observations, collected over more than forty years, of group stress management training in university and community settings. The specific data reported are from a subgroup that is representative of the other groups. An in-person group stress-management program of 141 adults in community clinics with approximately 15 to 20 per group attended 10 training sessions across 5 weeks with pre-post personality measures. The group also documented 5 weeks of home practice, symptoms, and medication use. The average group improvement in well-being was 80%, following training in breathing, progressive muscle relaxation, autogenic training, visualization, quieting response, and alphagenics, with individual temperature biofeedback having been provided during the last 5 classes. A pre- to post-two-way analysis of variance (ANOVA) revealed that the Spielberger State-Trait Anxiety Inventory (STAI) trait anxiety and Eysenck Personality Inventory (EPI) neuroticism significantly decreased. EPI extraversion increased only in females. Males and females equally preferred autogenic training (55%). The most successful males and females were older, practiced more, reported greater increases in self-confidence, and attributed more of their success to the group and/or instructor. The success of a program may also be associated with excellent home practice compliance, being a part of a group, and increases in self-confidence/efficacy.*

Stress management is effective in reducing numerous symptoms; however, interventions are predominantly provided when people are reporting medical or mental health issues, such as clinical levels of depression or anxiety (De Witte et al.,

2019; Toussaint et al., 2021). It would be much more effective to offer these services proactively, before people are beginning to experience symptoms that may lead to illness, especially now, when more people are experiencing stress and mental health symptoms (Braghieri et al., 2022; Bommersbach et al., 2023). The cost of one-on-one sessions is prohibitive for many people, particularly if one considers that any intervention generally needs follow-up and reinforcement of its practice. Previous group programs have demonstrated efficacy, and these will be presented in the discussion section as they relate to the major findings of this paper and to clinical practice.

This paper shares the research findings from a successful, educational-based group relaxation and biofeedback-assisted stress management program. This group program began in 1978 in two Ontario universities, and it continues to be highly subscribed and rated. There have been 12 trained instructors who have taught approximately 10,000 people over more than four decades. This program has been extended to teachers' organizations, medical health teams' wellness programs, sports teams, veterinarians, farmers' organizations, and small and large businesses within multiple communities. The specific data reported are from a subgroup that is representative of the other groups that we have taught in the past and are teaching currently.

We recommend a group format because it is more cost-effective and also provides the additional benefits of participants feeling that they are not alone or different from others (Pappas, 2023; Tucker & Oei, 2007). The group session showed that everyone does not learn the same way but that participants can learn from each other, which can enhance self-esteem and motivation. The instructor can clarify content and receive questions from the group that may not arise in one-on-one sessions. Typically, clients report that being

in a group reinforces a commitment to attend, learn, and practice and provides a respite that they look forward to and find valuable.

This is the first of three articles. This first article outlines the basic steps of the program, provides a summary of male and female participants' subjective experiences, describes changes in the scores of standardized psychological inventories, and reports on the participants' home practice and stress symptoms. A further examination compared the 30% who were most successful with the 30% of their counterparts who were least successful. The second article will provide a detailed review of male and female pre-post psychophysiological profiles, and the third article will outline ways in which this program has been successfully adapted to an online webinar format, along with research and suggestions for increasing the effectiveness and satisfaction of both the online instructor and the participants.

## Design and Content of the Program

This community-based program consisted of an introductory meeting that was followed by 10 one-hour training sessions across 5 weeks and a follow-up session after 1 month. Normally, there were no more than 20 people per group across different seasons of the year. All participants signed university-required consent forms. Because the program was open to all and because of students' and clients' privacy rights, there was systematic, in-depth demographic data collection. The program was open to anyone in the university and community. A few clients who specified a medical problem, such as tension headaches, anxiety, migraines, etc., were required to obtain their physician's approval to participate. No participant was eliminated because all had physician-approved participation.

This data reported in this paper are a sample from seven consecutive groups who took the stress management program that was provided to university and community individuals in exchange for a minimal fee for service and cooperation in research over a 2-year period. The research requirements included completing subjective and personality inventories; tracking practice, medications, and stress symptoms weekly; and taking part in two psychophysiological stress profiles.

Each lesson consisted of a brief review of the previous lesson, a discussion of clients' questions, progress, symptoms, or difficulties in home practice, the practicing of the main technique for the current lesson, and a brief discussion on its application in daily life. Individual temperature biofeedback was provided in the last five classes, using small, inexpensive, portable digital thermometers. Daily home practice was highly encouraged at each session. The 12-session program covered the following

topics (the step-by-step, detailed program is available at <https://www.selfregulationskills.ca/programs/12-session-outline/>).

### *Session 1*

- Introduction, history, intake questionnaires, past findings/research
- Discussion of eustress/distress/thrive
- Review of benefits for participating in the program
- Overview of the program's deep/long techniques (20 to 30 minutes) for restoration, brief techniques (6 seconds to 1 to 3 minutes) for integration into daily life, and how to practice at home

### *Session 2*

- Discussion of the benefits of effortless diaphragmatic breathing (Peper et al., 2017; Peper et al., 2020)
- Guided training of diaphragmatic breathing
- Review of how to practice brief and deep techniques in daily life

### *Session 3*

- Review of practice since the previous session
- Discussion of muscle tension and how to release it
- Guided training of progressive muscle relaxation: introduction and 16 muscle groups (Jacobson, 1978; McGuigan, & Lehrer, 2007); encourage increasing awareness of muscle tension during daily activities

### *Session 4*

- Review of practice since the previous session
- Guided training of progressive muscle relaxation for special areas, e.g., waist and low back, shoulders, neck and face; modifying it for specific situations

### *Session 5*

- Review of practice since the previous session
- Guided training of differential muscle relaxation while doing activities (Jacobson, 1978)
- Demonstration of the role of posture on neck and shoulder muscle relaxation, e.g., when working on computers and devices

### *Session 6*

- Review of practice since the previous session
- Discussion of autogenic training (adapted from Luthe & Shultz, 1969; Peper & Williams, 1980)
- Guided training of autogenic training: the six standard phrases

- Discussion of the role of passive attention and the relaxation response (Benson, 1976)
- Providing examples of self-monitoring and changing demanding self-talk phrases, such as should/must/got to

#### *Session 7*

- Review of practice since the previous session
- Guided training of autogenic training: lying down and seated; adding supportive phrases
- Discussion of how to transfer autogenic training into daily life
- Demonstrating and practicing hand warming (peripheral skin temperature) with discussion of the value of biofeedback in learning self-awareness control (fingertip temperature biofeedback continues through all of the remaining classes) (Peper & Gibney, 2003)

#### *Session 8*

- Review of practice since the previous session
- Discussion of alphagenics' visualization stress meter (Zaffuto & Zaffuto, 1974)
- Guided training of alphagenics, focusing on visualizing a personal stress meter and reducing the stress score via the previously taught techniques; encouraging the development of an awareness of mind and body sensations during various levels of relaxation

#### *Session 9*

- Review of practice since the previous session
- Discussion of imagery for relaxation
- Guided training of imagery/visualization while lying down

#### *Session 10*

- Review of practice since the previous session
- Discussion of imagery in mental rehearsal
- Guided training in mental rehearsal for coping and performance enhancement

#### *Session 11*

- Review of practice since the previous session
- Discussion of quieting response (Stroebe, 1982)
- Guided training in quieting response
- Discussion of open focus (Fehmi & Fritz, 1980)
- Guided training in open focus
- Discussion on further integrating the practices into daily life

#### *Session 12*

- 1-month follow-up
- Creation of a personal action plan for continued training; choice of favorite techniques; tips on sticking with it

## **Procedures**

### *Participants*

The participants were representative of a community clinic in which the majority of people were not under medical supervision. In this sample of 7 consecutive groups, there were 141 clients who completed psychological inventories and stress profiles in addition to attending the group stress management program. There was no significant difference in age between the 80 women (mean = 32.3 years) and 61 men (mean = 29.6 years), who ranged in age from 15 to 67 years. The clients were university students (57%) and community members (43%), and they either reported cognitive (36%) and/or somatic (54%) stress symptoms or wished to learn self-regulation skills (10%).

### *Instruments*

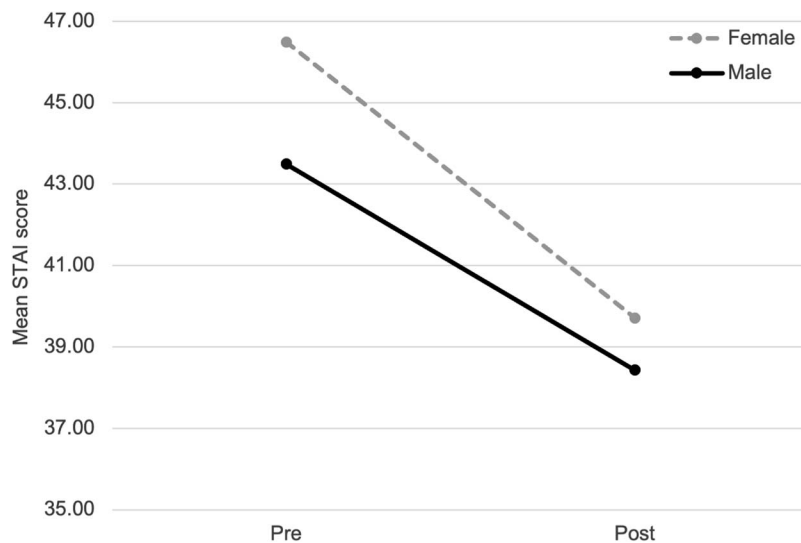
The Eysenck Personality Inventory (Eysenck & Eysenck, 1968) assessed the traits of introversion-extraversion and neuroticism-stability (emotional lability and over-reactivity). The trait scale of the State-Trait Anxiety Inventory (Spielberger et al., 1970) was used to assess general trait anxiety, and the Cognitive-Somatic Anxiety Questionnaire (CSAQ; Schwartz et al., 1978) was used to measure the cognitive and somatic aspects of trait anxiety.

Clients also participated in a psychophysiological stress profile before and after the program that included a baseline and stressors, followed by recovery. The stressors included anticipatory stress, cognitive, emotional, and physical (noise) stressors. The psychophysiology findings will be reported in the second article.

The clients were instructed on how to complete records of their medication use and the type, duration, and intensity of symptoms for 7 days pre-program, continuing daily throughout the program, and then again for 7 consecutive days at 1 month after the last class. To analyze the data, the researchers calculated a symptom level total by multiplying the hours of duration by the intensity for each symptom episode.

## **Data from the Sample Group**

The data for each variable were assessed for linearity, and, if they were not normal, a transformation was applied. A mixed two-way analysis of variance (ANOVA) was performed, with sex as the group factor and the pre-post scores as the repeated factor. Simple main effects were used to test when scores changed significantly within each gender. The *F* levels at the  $p < .05$  level were used for significance in all measures. Full details of the statistical procedures, as well as



**Figure 1.** STAI Trait Anxiety scores for females and males showed significant decreases from pre- to post-stress management program for both males and females.

results with graphs and interpretations, are stored at <https://www.selfregulationskills.ca/clinic-research/>.

As noted by Kroese (2019), success is not the opposite of failure, so one should study both the success and failure of programs. Thus, the data were reanalyzed to see if there were differences between those who rated the program as being very successful ( $n = 27$  females and 24 males; average rating = 128% improved) and those who reported the least success ( $n = 15$  females and 13 males; average rating = 18% improved).

### Subjective Evaluation of the Program by Females and Males

The participants' evaluations of the program showed no significant sex differences in the following four measures:

1. Both males and females rated the program at 3.1 on a 5-point Likert scale that ranged from 1 ("nothing gained") to 5 ("succeeded beyond my expectations/goals"), signifying that it was "meeting my goals or making definite progress."
2. At the conclusion of the program, females reported feeling physically and emotionally better by an average of 81%, and the males had an average of 79% improvement, as measured on a self-reported improvement scale of  $-300\%$  to  $+300\%$ , with the zero point representing how the client felt emotionally and physically before the program began. One month following the program, the females reported that their improvement in well-being was at 90%, whereas the males reported improvement at 74%.

3. Both sexes reported that a positive contribution to the changes in their skills, stress levels, or behaviors was due to the social support or social interaction with other people in the class and/or the instructor. The females reported a 37% contribution, and the males reported a 32% contribution from social support.
4. At the end of the program, the females reported an average increase in self-confidence of 44.5% from learning these skills, whereas the males reported an average increase of 42%.

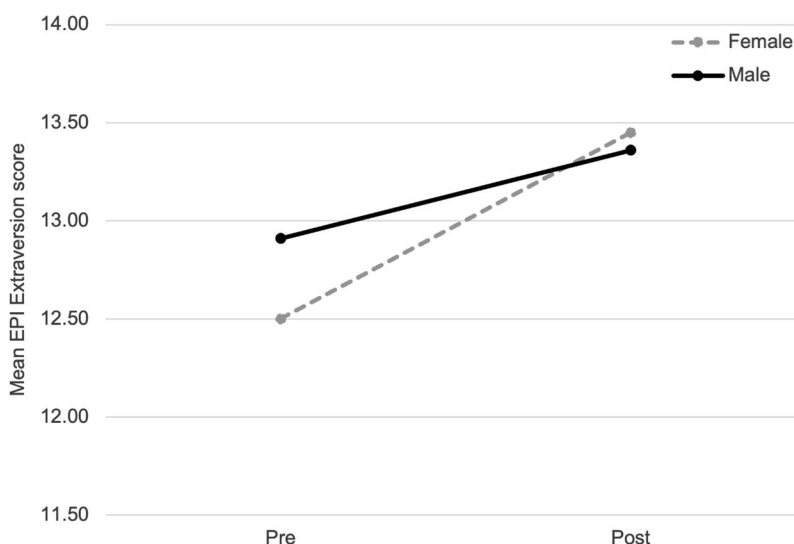
### Psychological Inventories for Males and Females

The two-way ANOVA for the pre-post STAI scores showed that there was a significant reduction in trait anxiety for both males ( $M = -5.06$ ,  $p < .001$ ) and females ( $M = -6.78$ ,  $p < .001$ ) (see Figure 1). Males and females were not different from each other in either their STAI scores or the amounts of their changes in STAI scores.

The distribution of the CSAQ (cognitive or somatic anxiety) scores was positively skewed. Thus, a nonlinear transformation was applied to create a normal distribution.

The CSAQ inventory was administered once, pre-program, with the cognitive scores being significantly higher than the somatic scores for both females ( $M = 1.67$ ,  $p = .005$ ) and males ( $M = 2.69$ ,  $p < .001$ ). There were no sex differences, nor were there differences in the sex by type of anxiety interaction.

Males and females were not statistically different from each other in their initial EPI extraversion or in the amounts of their changes in their pre-post extraversion scores. The females had



**Figure 2.** EPI extraversion/introversion pre to post scores indicate that only females significantly increased in extraversion.

a statistically significant increase in extraversion after the program ( $M = 0.95$ ,  $p = 0.006$ ), but the males did not (Figure 2).

The two-way ANOVA for the pre- to post-EPI neuroticism scores showed that there was a significant decrease in neuroticism for both males ( $M = -1.64$ ,  $p = 0.003$ ) and females ( $M = -2.17$ ,  $p < 0.001$ ) (Figure 3). Males and females were not different from each other in their neuroticism scores or in the amounts of their changes in neuroticism.

### Home Recordings for Males and Females

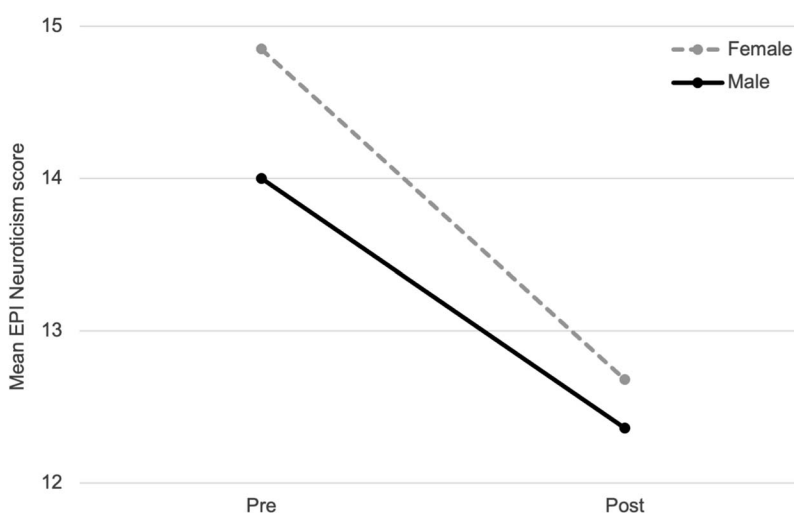
With the data from home recordings of symptoms, medication, and minutes of training, no statistical analyses were conducted, due to the small sample size with repeated measurements. The data were graphed to observe trends, and

they were similar to the data reported by students and clients in previous training programs.

The females appeared to have more symptoms than males over the weeks of the program, with the female average score being 67 symptoms/week and the male average score being 56 symptoms/week, as noted in Figure 4. Pre-program, there were no significant sex differences in either the number of years with symptoms or the severity of symptoms. Interestingly, 1 month after the program, there was a continued 7% decline with the males' symptoms and a 19% decline for the females from their average levels during the program.

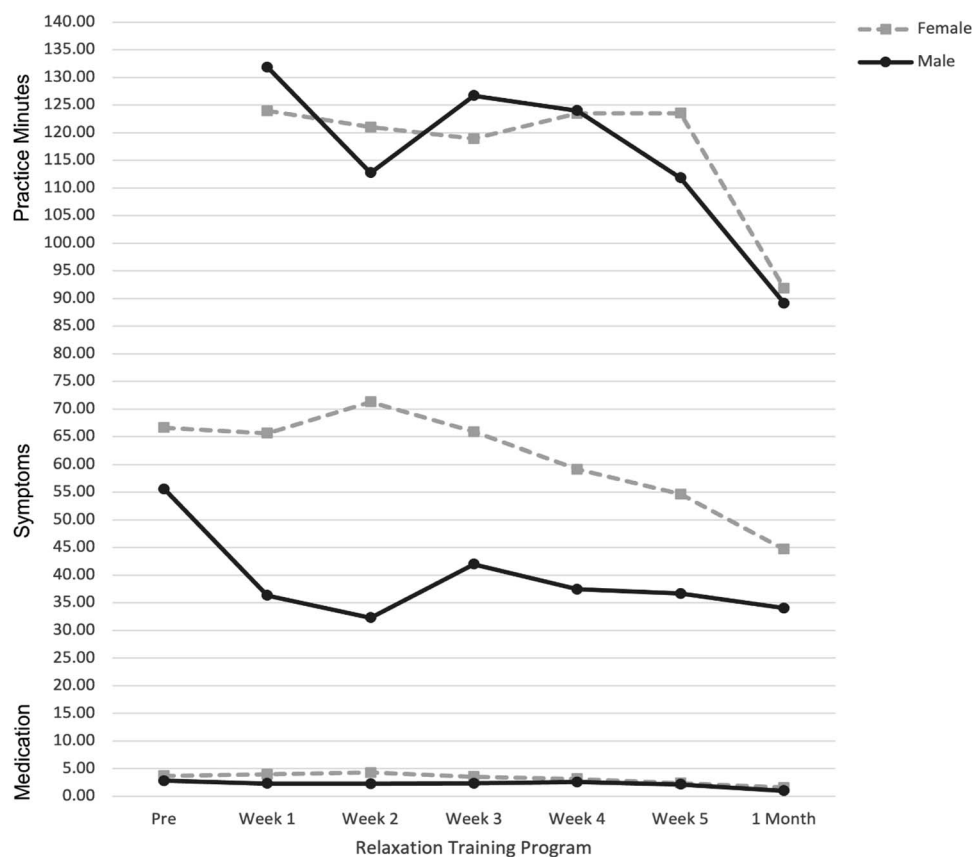
### Medications

The females reported using more medication during the program, averaging 3.5 medications/week, whereas the



**Figure 3.** EPI neuroticism/stability pre-post scores show that females and males significantly reduced neuroticism.





**Figure 4.** Home training throughout the program showed that males and females had consistently high practice minutes. Both males and females reduced the number of symptoms, although the females continued to have more symptoms. Both groups had a low rate of medication use throughout the program.

males averaged 2.4 medications/week (Figure 4). Both groups showed a pattern of reduction in medications throughout the program and a further decline after the program. At 1 month post-program, the males' medication average had decreased 42%, and that of the females had decreased 54%, relative to their average levels during the program.

### Home Training

There appeared to be no significant difference in home training minutes over time between females and males (Figure 4), who practiced an average of 122 minutes/week. One month following the programs, both were practicing an average of 90 minutes/week, which is a decrease of approximately 25% from the practice observed during the program.

### Technique Preference

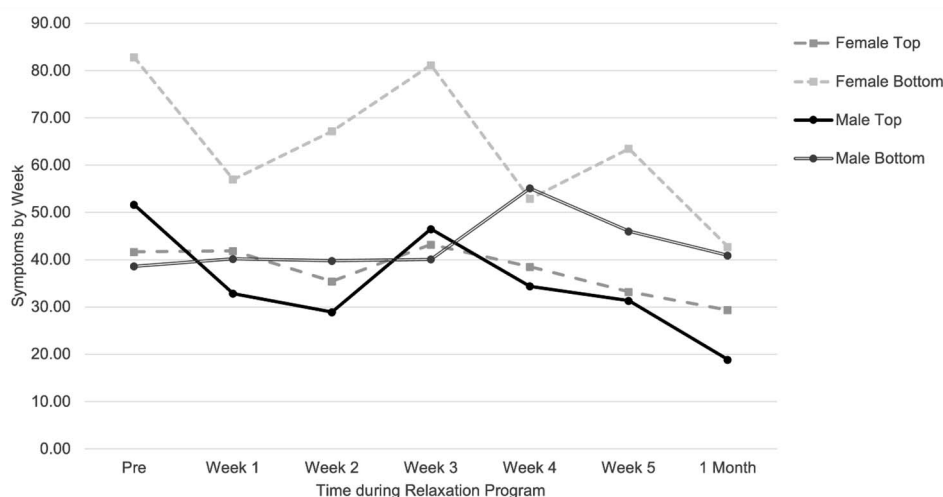
The technique most preferred by males and females (56%) was autogenic training. The second most popular choice for females was alphagenics (15%), whereas it was progressive muscle relaxation (PMR, 16%) for males. The third choice

for females was PMR (10%), whereas males chose alphagenics (11%) and quieting response (11%).

### Evaluation of the Program by Most vs. Least Successful Males and Females

Those who rated their improvement in well-being as 100% or greater (27 females,  $M = 130\%$  improvement; 24 males = 125% improvement) were considered to be the most successful group. Those who rated improvement from 50% to 99% were considered to be moderately successful and were not used in the data comparison. Those who reported feeling less than 50% improvement were classified as the least successful group. Of those who were least successful, the 15 females averaged 21% improvement, and the 13 males averaged 15% improvement. A two-way ANOVA of success (top vs. bottom) by sex (female vs. male) was utilized for comparisons, using the  $p < .05$  level for statistical significance.

The successful females and males were older than their less successful female and male counterparts ( $F = 10.91$ ,  $p < .002$ ). There were no differences between success groups in the number, severity, or length of time of symptoms or in the medications taken prior to the beginning of the program.



**Figure 5.** Symptoms for the most and least successful male and female groups indicate that the least successful females had the largest number of symptoms. The numbers of symptoms across the time of the program for the successful and less successful females are higher than those of their male counterparts. Only the least successful males did not have a reduction in symptoms over the duration of the program.

The most successful males and females more frequently rated the program as “succeeding beyond my expectations/goals,” compared to those who were less successful ( $F = 8.58, p < .005$ ). The most successful participants attributed part of their success to the social support/interaction with others in the class and/or the instructor ( $M = 45\%$ ) at twice the amount of those in the least successful group ( $M = 19\%$ ) ( $F = 15.74, p < .0005$ ). Additionally, the most successful reported more than twice the increase in self-confidence (55%), compared to those who were least successful (22%,  $F = 12.67, p < .001$ ).

#### *Psychological Inventories by Most vs. Least Successful Males and Females*

There were no differences in the STAI or EPI inventories between the most and least successful groups. There was an interaction between CSAQ cognitive anxiety and sex ( $F = 4.23, p < .05$ ), with the successful females displaying lower cognitive anxiety than did those who were least successful, whereas the most successful males had higher cognitive anxiety than did the least successful males.

#### *Home Recordings by Most vs. Least Successful Males and Females*

Due to the relatively small sample size with repeated measures, the data for home training minutes, medications, and symptoms by success group over time were graphed to identify trends (Figure 5). The number of symptoms of the least successful females varied weekly but trended downward and were consistently higher than were those of the most successful females, whose symptoms showed little change. The

symptoms of the male groups were initially at similar levels, but, over time, the most successful males trended downward, whereas the less successful males trended upward.

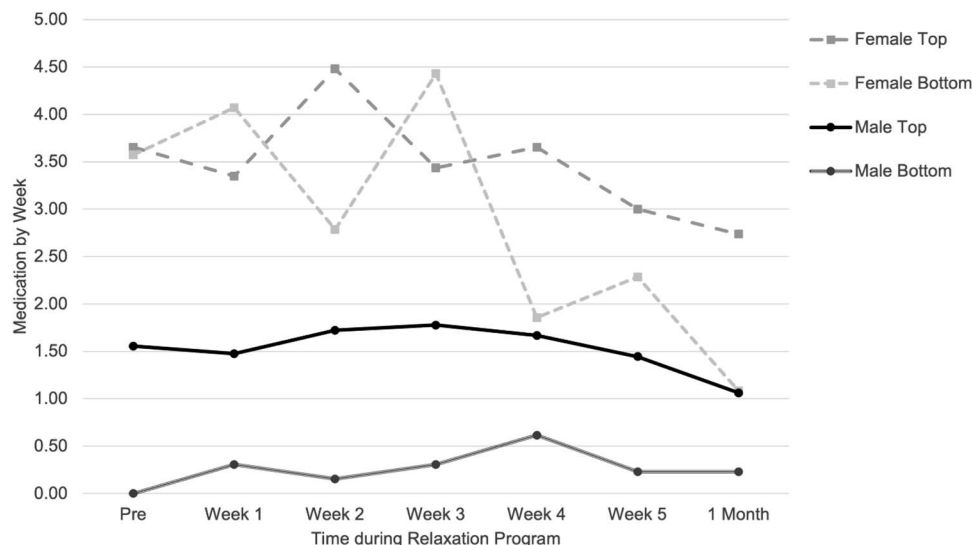
The most successful female group reported taking more medications during the program, compared to the others (Figure 6). The lowest amount of medication use was by the least successful males. Throughout the program, the females trended downward in medication use, but the males did not.

Although the home training practice was consistently high for all participants, the pattern (Figure 7) suggests that the most successful male and female groups consistently practiced for more minutes than did the least successful males and females. The more successful males practiced approximately 50 minutes more per week, and the females 30 minutes more per week, than did their least successful counterparts.

## **Discussion**

The data presented here are a sample from a community stress management clinic, as opposed to a research paradigm. Thus, there were no active control groups. Consequently, it is possible that the changes reported may be due to actual treatment effects or possibly regression toward the mean, the passage of time, expectancy, attentional effects, or other factors. Brown et al. (1998) report that nonspecific factors may affect results, including the belief they that could control their own lives, opportunities to talk to others, finding out they are not alone, and gaining hope.

The program was well-attended, with males and females equally attending 80% of the sessions, with the return of 73% of the attendees being observed at the 1-month follow-up class. We attribute the high return rate to their



**Figure 6.** Both the successful and less successful female groups reported more medication use than did their male counterparts, but they showed reduction towards the end of the program, unlike their male counterparts.

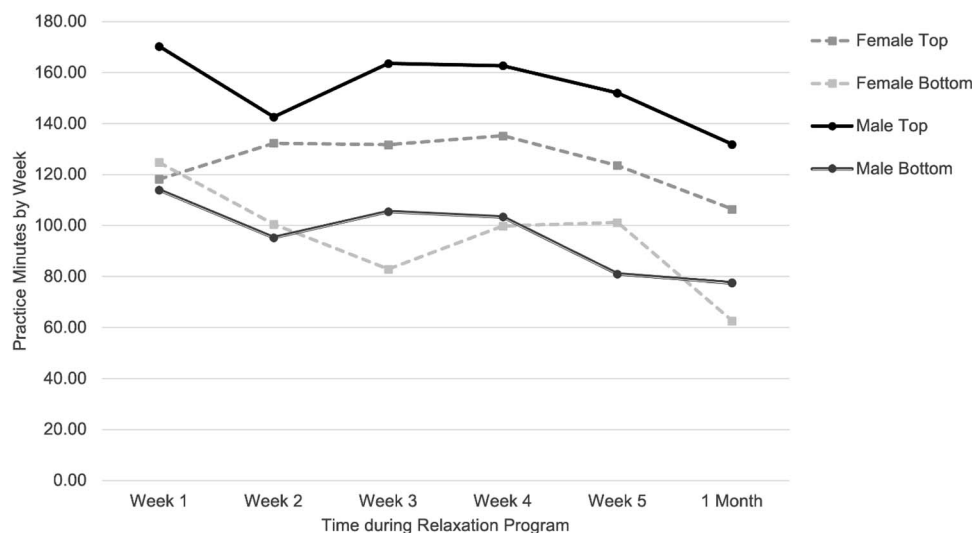
interest in getting a post-program psychophysiological profile, their commitment to helping the research program, or the incentive of a \$20 refund for the completion of forms. The financial rebate was only offered to this group for participation in the pre- and post-psychophysiological assessments.

### Participants' Evaluations of the Program

The first measure of evaluation indicated that male and female participants were successful in meeting their goals, with 80% feeling physically and emotionally better, which is higher than the results reported by Bird et al. (1985) and

De Anda (1998). Interestingly, at the 1-month follow-up, the females reported even further improvement than they did at the final class, whereas the males had a slight decrease in improvement after the final class. In similar programs, Stangle and Lowinger (1998) found that benefits were sustained at a 3-month follow-up, and Nakagawa-Kogan et al. (1984) reported a continuation of gains made by nurses at the 1-year follow-up. Perhaps, the improvement persisted due to the continued practice or improved self-awareness of stress symptoms.

The benefits of providing group classes are reinforced by these participants, indicating that some of the improvement



**Figure 7.** The number of minutes of practice per week remained high throughout the program for all groups, with the most successful groups practicing for more time than did their least successful counterparts.



in their skills, stress levels, or behaviors was due to the positive contribution of social support/interaction with other people in the class and/or the instructor. Further, the most successful male and female groups reported higher contributions from social support than did the least successful groups. Although Baum and Grunberg (1991) found that women generally report more social support and a greater use of support networks than do men, in this sample, the males and females had similar benefits. Terp et al. (2019) emphasize the importance of being part of a group and that the group also acts as a facilitator for behavioral change, perhaps by creating community, social identification, and support. Research on brain mechanisms link social integration or social support with reduced neural threat responses and stress buffering (Ditzen & Heinrichs, 2014), bolstering the idea of group stress management programs as a possible treatment strategy.

Instructors significantly impact success in stress management programs. Taub and School's (1978) subjects had more success at hand warming with friendly, rather than impersonal, biofeedback therapists. Lashley et al. (1987) found that verbal reinforcement from a live group leader facilitated temperature biofeedback training and that group cohesion developed readily under conditions of feedback and/or verbal reinforcement. Duckro and Cantwell-Simmons (1989) also reports better results when the therapist interacts in an encouraging, rather than an aloof, manner as well as when the therapist expects a successful outcome. The instructor's voice quality and speech rate impacted success in muscle relaxation training in females with self-reported anxiety (Knowlton & Larkin, 2006). When participants perceived the therapist's voice as helpful in achieving a relaxed state, they were more likely to engage in home practice, a variable positively related to outcome (Wittrock et al., 1988). Pillette et al. (2021) recently found that relaxed participants had higher performance on brain-computer interface mental imagery tasks when training with female experimenters, whereas tense participants had higher performance when training with male experimenters.

Both males and females reported an improvement of approximately 43% in their self-confidence from learning these self-regulation skills, with the more successful men and women reporting twice as much of an increase in confidence, compared to their less successful counterparts. While the program did not target self-confidence, the opportunity to try techniques may have enhanced self-awareness that contributed to increased self-control (Pekrun, 2006) and achievement that then increased self-confidence. Further, Glass and Levy (1982) found that perceived success in biofeedback and self-regulation

training led to a more positive mood, stronger causal attributions to effort, less causal attributions to task difficulty, and expectations for future effective self-control. Further research on the relationship between feelings of success and self-confidence is needed to explore the improvement of elements of the program to effect positive change.

We hypothesize that having the program housed and supported by the university, with support and referrals from local healthcare agencies, gave it significant credibility as being valuable. Also, with longevity in the community came word-of-mouth support, which then filtered into local news media and healthcare organizations. These factors perhaps increased participants' commitments to the program and expectations of success.

## Pre-Post Changes in Psychological Variables

### STAI (Trait Anxiety)

The significant decrease in trait anxiety, for both males and females, was expected and is reasonable, considering that this was the basis of the program and has been previously reported (Eppley et al., 1989; Kiselica et al., 1994; Aritzeta et al., 2017). Although trait anxiety is generally higher in females (Yamasue et al., 2008; Moser et al., 2016), this was not true in this sample. Even those who reported less success in the program significantly decreased trait anxiety, supporting the use of cost-effective stress management group programs for the general population.

There were no significant differences between females and males, nor by the level of success, on the CSAQ somatic anxiety scale, whereas Steptoe and Kearsley (1990) found higher somatic, as opposed to cognitive, anxiety in female and male athletes, meditators, and sedentary controls. DeGood et al. (1985) and Jin et al. (2014) showed that both females and males had higher cognitive anxiety scores, compared to somatic scores, which was true for the participants in this study.

Interestingly, the successful females had lower cognitive anxiety than did the less successful females, whereas more successful males had higher cognitive anxiety than did the males who were least successful. Perhaps, this style of group program better fits males with high cognitive anxiety, or, possibly, females with high cognitive anxiety have other factors present that influence their success in this type of group program. Since the nature of the population, gender, cultural differences, motivation, and social experiences may have an impact on whether anxiety is experienced in a cognitive or somatic manner, the stress management program needs to contain physical and psychological management skills.

### *EPI Extraversion/Introversion*

Females, but not males, had significantly increased extraversion scores post-program, but there were no differences due to degree of success. The initial mean EPI extraversion/introversion scores for females and males were lower than an English or American population (Eysenck & Eysenck, 1968), but they were similar in extraversion/introversion scores to university students in the same province in Canada (Skinner & Peters, 1984). Because extraversion has been linked to subjective well-being, positive emotionality, and task focus coping (Diener, 2000; Matthews & Zeidner, 2000), it is noteworthy that females improved, but it would be important to determine why males did not.

### *EPI Stability/Neuroticism*

Both females and males significantly lowered their neuroticism scores, and there were no differences related to degree of success. As neuroticism has been shown to be related to negativity (Matthews & Zeidner, 2000) and coping (Austin et al., 2010), this is an important improvement outcome, particularly since the initial scores place them close to outpatients in treatment for anxiety syndromes on Eysenck norms, which suggests that they were perceiving a need for assistance. The decreases in neuroticism may be related to their decreased trait anxiety and the class structure, under which exercises focused on the individual's perception of and control of mind/body responses to stress and did not pathologize the state. They were also able to integrate their self-regulation skills into daily life, which reinforced their self-belief in the possibility of change. This change is similar to that of Brown et al. (1998), who found that not just worried, well people enroll in public stress management programs, with even the least distressed being capable of benefiting from such interventions.

The findings of no differences in personality measures by degree of success for both males and females suggest that personality may play only a minor role in determining the success of a group stress management intervention.

### **Home Recordings**

Participants recorded symptoms, medications, and minutes practiced across 10 weeks. The benefit of data measurements across time is that a pattern can be established, thereby allowing for the checking of consistency over time. In this study, one can see the trend that both males and females improved in symptoms and medication across the program, but at different periods in time. Learning may progress differently for males and females, as illustrated by Pillette et al. (2021), who used EEG-brain-computer interface mental imagery tasks

and found that males started at a lower performance level and then improved, whereas females started at a higher level and then decreased in their abilities across trials. This is a reminder that not everyone responds at the same pace.

Our finding that females report more symptoms than do males agrees with that of Krantz et al. (2004). There is a clear pattern of females decreasing symptoms and medication starting at Week 2 and continuing throughout the remainder of the program and into the 1-month follow-up. When viewed by degree of success, the largest decrease in symptoms was for the least successful females. They initially reported the most symptoms and had half that amount at 1-month post-program, yet this reduced level still exceeded the symptoms of the high success groups. Perhaps, still experiencing a significant level of symptoms post-program, despite having the greatest decrease of symptoms, led to their lower ratings of improvement in well-being from the program.

Some people appear to improve immediately, while others take more time, whether due to expectancy, a Westinghouse effect, the keeping of a diary, or the breathing training in the program's first week.

The females displayed significantly more medication use than did the males, similar to findings in the systematic review by Shaghghi et al. (2014). Neither the successful males nor the less successful males decreased medication use, and surprisingly, the largest decrease in medication use was in the females who had the least success. They also had the greatest decrease in symptoms, so it is possible that the decreased medication use is associated with experiencing fewer symptoms but was not sufficient for them to feel much improvement in well-being.

The females averaged 17.5 minutes of home practice per day, and the males averaged 14 minutes/day. The most successful males and females practiced more than did their least successful counterparts, which may account for their reported success in this program, as others (Carmody & Baer, 2008; Huppert & Johnson, 2010) report that those practicing more would benefit more. Hillenber and Collins (1983) found that those who consistently practiced PMR at home over 5 weeks reported less daily general anxiety and tension, compared to those who did not do home practice. Perhaps, the pre-post reduction in trait anxiety in our participants was also related to consistent home practice. Eisen (2005) found that those with higher practice compliance had significantly greater reductions in multiple stress indices, whether they were attending an in-person group relaxation program or going at their own pace in an individual online program. The decrease in practice in the

second week by three of the four success groups (a pattern we have seen before in our clinical practice) may correspond with a decrease in symptoms that week or, perhaps, a sense that the program will be helpful and that less practice is needed. It may be important for both the instructor and the client to be cognizant of this pattern of early or no improvement so as to avoid discouragement, quitting, or a premature assumption that the problem is resolved.

Future research should attempt to measure the quality of the practice, preferably with psychophysiological monitoring of the various modalities (temperature, muscles, etc.), which would document changes and the proximity to criteria of full physiological relaxation as well as enhance motivation and increase stress reduction. Wearable technologies make this increasingly feasible.

While practice time had reduced to approximately 90 minutes/week at the 1-month follow-up, the participants continued to practice, despite no longer meeting as a group, and they reported improved well-being continuing at almost the same level as that reported at the final class. Like King (1980), the transfer of skills was practiced within class sessions to encourage integration into home and real-life conditions. In addition to the \$20 incentive given for completing weekly home training forms and attending the 1-month follow-up, the act of recording daily practice minutes and symptoms may reinforce training. Practicing self-regulation can improve how people feel, and feeling better reinforces continued practice. Home tracking devices with device and program feedback for consistent encouragement could be integrated into future programs to facilitate ongoing practice.

The improvements in symptoms and medication as well as the continuing practice 1 month after the class sessions suggest the beginning of a habit. Habit development is noted as one of the lasting methods by which people obtain and maintain self-regulation (Kroese, 2019). Lally et al. (2010) report an average of 66 days to develop a strong habit, with a wide variation from 8 to 254 days. The context of this program encouraged habit development via a consistent focus on cues from their bodies (self-awareness aided by biofeedback), repeated opportunities of experiencing a relaxation state, and practicing brief skills to quickly recreate the awareness and relaxed state, which could then transfer to practice in other independent environments. Wittrock et al. (1988) noted that it was the degree of the relaxed state that differentiated the successful patients from the less successful patients. Additionally, the provision of temperature biofeedback and logging of progress possibly created expectations which, as shown by Wittrock

et al. (1988), may have accounted for the degree of success. Ford et al. (1983) noted that most patients can acquire the relaxation techniques in 8 weeks, but long-term benefits are a matter of daily home practice with the generalization of the effects being enhanced through transfer skills, such as the 6-second quieting response.

## Technique Preference

Both females and males most preferred autogenic training. The second most popular choice for females was alphagenics, whereas for males, it was PMR. This is similar to the results of Bird et al. (1985), who reported that the first choice was autogenic training and that the second choice was PMR. We do not know if this is due to an order effect, the instructors' abilities to teach these techniques, or if these techniques were more effective at reducing their symptoms.

Early research (Lehrer & Woolfolk, 1983; Murphy, 1996; Timmerman et al., 1998) suggested that there is no single best relaxation technology, that not all techniques are equally efficacious, and that the most powerful stress management and behavioral medicine programs are multi-component programs. In a later review of 64 studies on the stress management of athletes, Rumbold et al. (2012) found that multimodal programs were beneficial in achieving stress reduction, and Hoareau et al. (2021) noted that a stress management program with a variety of components significantly reduced perceived stress more effectively than did heart rate variability biofeedback training alone. Lehrer and Woolfolk (2021) also report that for various disorders, multimodal programs produce more powerful therapeutic effects than does any individual technique alone and that the subtle differences between techniques may have clinical significance.

Benson et al. (1974) and Peper et al. (2019) believe that all relaxation techniques create a common integrated relaxation response. While components of programs differ, i.e., alphagenics, autogenic, biofeedback, breathing, imagery, meditation, mindfulness, PMR, quieting response, etc., they may all decrease sympathetic arousal. Most techniques also include the practices of letting go of thoughts and focusing on the present, which were also included in this program.

In this study, presenting a variety of techniques better addressed the individual preferences of a diverse group and likely enhanced group adoption/effectiveness. Clients who ruminate have been encouraged to practice letting go, which was purposely incorporated into the teaching and



practice of each technique (PMR, autogenic, etc.) in the program.

### Male-Female Differences and Differences by Success in the Program

While the program was equally effective for males and females, there were some significant differences in their stress symptom intensities and responses to the program. It is important for future work to look separately at data from males and females to determine which parameters cause differences in those participants who feel the most and least successful.

One possible contributor to male-female differences is the finding by Dolcos et al. (2020) that females have enhanced sensitivity to emotional stimuli, especially negative stimuli, and show negative affective bias in attention and perception while also exhibiting enhanced competence in the processing of emotions. Additionally, Rattel et al. (2020) noted that females have a higher/stronger concordance (response concordance is the integration of thinking, feeling, and responding) than do males on almost all physiological parameters and that females are better than males at recognizing emotions, expressing emotions, and being more aware of emotions. Rattel et al. (2020) further postulate that these sex differences may be due to better awareness because women are more responsive and sensitive to the environment. These concur with the Bekker and Mens-Verhulst (2007) summary that although anxiety disorders are more prevalent among women than among men,

*scant attention has been given to these differences in terms of treatment... Prevention and treatment of anxiety disorders might be more effective if the available knowledge about gender specificity was implemented. Concomitantly, treatment effect studies could be improved by greater consideration of gender throughout the research process. (abstract, p. 178).*

The differences between participants by sex and success suggests that researchers should further evaluate this relationship with a larger sample size to determine which components of the program are most associated with compliance, failure, and success. Additionally, a longer time period for follow-up evaluation is recommended (Ford et al., 1983).

### Summary

The group stress management program was effective for females and males, with decreases in anxiety, neuroticism,

symptoms, and medication as well as increases in self-confidence, extraversion, and feelings of well-being. The amount and consistency of home practice was impressive, with continued reductions in symptoms and medication 1 month after the program. Males and females differed in their patterns of home practice, changes in symptoms, and medication use over time. The most successful males and females were older, practiced more, reported greater increases in self-confidence, and attributed more of their success to the group/instructor. Further study should focus on the needs of those who did not achieve as much success.

One component of success may be the commitment and motivation that was generated through a program that was structured with a variety of techniques, the provision of their scientific rationale, an experiential awareness during class training, classroom opportunities to learn/share experiences with peers, and group reinforcement. A second component of success may have been the ongoing home practice with journaling, feedback, and a reward for compliance. Future studies should include the nature of the group (culture, environment, race, sex, etc.), mind and body measures, and reporting of the components of the course content, as all of these are factors in unique responses to a stress management program.

The findings of this study suggest that in the face of increasing stress, mental health issues, COVID-19, and financial strains, a group stress management program is a cost-efficient and effective method by which to increase self-regulation, reduce anxiety, and enhance well-being. We recommend that this type of group program should be based in a university setting because a university engenders respect and legitimacy. Ideally, it should be part of a student's college learning experience and should be available to community members to improve physical and mental health.

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