

Inoculation Training on Anxiety and Performance to Have a Reasonable Reaction

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Abstract

The development of effective training procedures to prepare the individual to resist the negative impact of stress is of considerable interest to government and industry. Stress inoculation training is a cognitive-behavioral stress intervention that has shown considerable promise; however, a number of questions arise regarding the application of this clinically-based approach to more applied settings. A meta-analysis was conducted to determine the overall effectiveness of stress inoculation training and to identify conditions that may moderate the effectiveness of this approach. Results indicated that stress inoculation training was an effective means for reducing performance anxiety, reducing state anxiety, and enhancing performance under stress. Furthermore, the examination of moderators such as the experience of the trainer, the type of setting in which training was implemented, and the type of trainee population revealed no significant limitations on the application of stress inoculation training to normal training environments.

Keywords: meta-analysis, stress, examination of moderators.

1. Introduction

One consequence of the rapid technological advances of the past several decades is that many jobs have expanded greatly in complexity and place high demands on the individual. The impact of stress on performance has become a primary concern not only in the high-technology aerospace, military, and nuclear industries, but also in most applied work settings (Ivancevich, Matteson, Freedman, & Phillips, 1990). Accordingly, the development of effective interventions to overcome the detrimental effects of stress is a task that has taken on increased importance in the training community (see Driskell & Salas, 1991; Goldstein, 1989; Goldstein & Gilliam, 1990).

Stress inoculation training is a cognitive-behavioral approach to stress management that was developed in the early 1970's as a treatment program for phobias (Meichenbaum & Cameron, 1972). Since then, stress inoculation training has been implemented as a stress treatment program with considerable success in a wide range of settings. However, in reviewing stress intervention programs, Newman and Beehr (1979) noted that the most glaring deficiency was the lack of rigorous evaluation, and that much of the research evidence was comprised of case studies, non-empirical reports, and studies lacking appropriate controls. Wexley and Latham (1991) agree: In posing the question of what we can conclude about the effect of stress management programs, they answer that proof of the effectiveness of these programs is difficult to obtain. Therefore, although the preponderance of evidence suggests the efficacy of the stress inoculation training approach, the overall effectiveness of this approach has not been clearly established (see Meichenbaum, 1993).

1.1. The Concept of Inoculation

A central concept underlying SIT is that of inoculation which has been used both in medicine and in social-psychological research on attitude change. In 1796 Edward Jenner noted that inoculation of humans with cowpox conferred immunity against the forms of a disease so as to ward off more severe reactions. In such cases, the earlier exposure is generally to a more moderate form of the stress or disease to be guarded against. Such exposure produces antibodies and physically prepares the body for future attacks.

Consistent with the concept of inoculation, Aldwin and Levenson (2004) highlight an area of biology called *hormesis* that studies the positive results that derive from exposure to small amounts of toxins that in larger amounts might prove lethal. A series of studies on animals indicated that small and brief exposure to stressors can contribute to the development of repair mechanisms that protect against the impact of subsequent, more intense stressors (Calabrese & Baldwin, 2002). In a comparable fashion SIT, which is designed to intervene with humans at the psychosocial level, provides individuals with experience with minor stressors that fosters psychological preparedness and promotes resilience.

Similarly, in the area of attitude change, McGuire (1964) has observed that prior exposure to attitudinal information can protect or “inoculate” individuals from subsequent, more intense efforts at persuasion. Such prior exposure to persuasive efforts mobilizes counter attitudinal strategies that can be used in subsequent conversion efforts. In both medical and attitudinal inoculations, a person’s resistance is enhanced by exposure to a stimulus strong enough to arouse defenses and coping processes without being so powerful that it overwhelms the individual. SIT is based on the notion that exposing clients to milder forms of stress can bolster both coping mechanisms and the individual’s (group’s, community’s) confidence in using his or her coping repertoire. SIT is designed to bolster individual’s preparedness and develop a sense of mastery.

1.2. Effects of Moderators

How distressed individuals and communities try to make sense of and transform their emotional pain can influence their coping processes. The more individuals and communities engage in the cognitions and behaviors enumerated in Table 1, the greater the likelihood that they will have persistent stressful reactions.

In some studies, subjects were pre-screened and a high anxious population was chosen for training intervention (e.g., Adams, 1981). Other studies used an unscreened or normal anxiety level subject population (e.g., Jay & Elliott, 1990). Some research suggests that high anxious subjects are more likely to be characterized by greater worry and self-doubt, self-deprecation, and preoccupation with interfering thoughts and feelings (Meichenbaum & Butler, 1978; Deffenbacher, 1986). Stress inoculation training practitioners have placed great emphasis on modifying cognitive processes, or the manner in which anxious individuals maintain negative beliefs (Meichenbaum & Deffenbacher, 1988). Therefore, there is some question whether the stress inoculation training approach may be as effective for a “normal” population that, by definition, is not as self-absorbed by these thoughts and ruminations. Furthermore, it is likely that a high-anxious population may be more responsive to a stress training intervention than normal anxiety-level trainees. Indeed, Fremouw and Zitter (1978) reported a non-significant trend indicating that stress inoculation training was more effective for subjects with high anxiety. To examine whether the type of trainee population moderates the effectiveness of stress inoculation training, we examined separately those studies in which stress inoculation training was conducted with a high-anxious subject population and those studies using a normal anxiety subject population.

This paper proceeds as follows: the next section provides the methodology applied in this paper. Section 3 presents the results of the application of the method, or the treatment. Section 4 discusses the results and Section 5 provides a conclusion.

2. Methodology Design

The study adopted a 2x2x2 pre-test, post-test, control research design.

2.1. Subjects

Eighty selected subjects from secondary schools in Tehran were the participants in this test-anxiety management training program while students on a waiting list were used as control group. There were 40 males and 40 females from two randomly selected secondary schools population in Ibadan Metropolis. They ranged in age from 15-17 years. The subjects were senior secondary school II (SSII).

2.2. Procedure

After responding to test anxiety scale which was used as a screening device subjects were randomly assigned to experimental and control groups. Based on their anxiety scores, they were divided into low and high levels of test anxiety. Participants were seen in person and were given pre-treatment assessment in the two experimental groups. Psychotherapeutic exposure was provided to the participants. The study was carried out in two waves, (that is, forty subjects in the experimental condition and forty in the control groups). The conditions in the two locations used for the experiment was identical.

2.3. Dependent Measure

Subject who participated in the program completed Bakare Test Anxiety Scale (BTAS) and Achievement test during the week prior to treatment, the last week of the treatment, and six weeks after the end of the treatment program. Control group subjects completed the scale during the week prior to the start of the treatment program and during the last week of the program. Bakare Test Anxiety Scale is a self-report instrument, which measures test anxiety. The Test Anxiety Scale consists 37 items that ask subjects to describe how they feel when writing examinations. The Achievement Test consists of 100 multiple choice alternatives in Mathematics, English Language, Yoruba, Geography and the Sciences.

3. Treatment

Subject participated in eight one-hour sessions which held once a week, for eight consecutive weeks. The program consisted of eight basic components, presentation of a conceptual framework, identification of a conceptual framework, identification of emotional responsiveness of individual subject, identification of unrealistic beliefs, negative self-statements and anxiety physical arousal relating to subjects under achievement in examinations, recognition of habitual and maladaptive thoughts related to success, or failure in examinations in the modification of negative self-statements using coping self-statements, developing and testing new skills to counter the anxiety responses, application and practice of new acquired skills on stressful situation and review of previous session's activities and administration of post-test instrument.

During the first session, participants introduced themselves to each other, and definitions of stress inoculation, incidence of test anxiety, causes of test anxiety, and effects of test anxiety on

students and their academic performance were discussed. Each participant was then asked to identify specific situations which were stressful for him/her during test or examinations. Situations identified involved ineffective preparation for tests, fear of failure, irrational thoughts about test, lack of personal reading time-table, deficient study habits and interruptions from friends and neighbors during study periods. Participants were given an overview of the coping skills to be taught during the next session and were told that in order for the techniques to be helpful to them daily practice between sessions was necessary.

The second session focused on the identification of emotional responsiveness in individual subjects. The therapists and the subjects discussed personal problems, negative and irrelevant thoughts which are known to affect the subjects' studies and make them anxious when they are about to write any test.

During the third session, participants were presented with the identification of unrealistic beliefs, negative self-statements and anxiety physical arousal relating to subjects' underachievement in test. The therapists and the subjects discussed Meichenbaum and Turk's (1976) "Stress Inoculation Training" (SIT). Subjects were provided with the information that a stress reactions takes place in stages. Some of these stages include: preparing for stressor, confronting a stressor, being overwhelmed for having coped, and self-reinforcement for having coped. Subjects were informed that stress reactions are not as automatic as previously thought and that they can intervene in the middle of the reaction with various learned techniques.

During the fourth session basic irrational beliefs were reviewed and participants discussed how these beliefs contributed to their over anxiousness during tests. In the fifth session, participants were presented with the role of self-statements in emotions and behavior. The idea that emotions are not the direct result of events, but are a product of the view an individual takes of them was presented, and personal responsibility for emotions was emphasized. They were also trained on how to modify their negative self-statement by replacing them with positive self-statements.

The sixth session focused on developing and testing new things to counter the anxiety responses. The therapist and the subjects discussed how to develop and test new things to do and to think on how they that can prevent and/or counter the anxiety responses. These new things include relaxation techniques. They were also trained to develop statements to say to themselves prior to meeting the stressor.

The seventh and eight sessions focused on rehearsal and application of treatment conditions. Participants were taught how to develop "Stress Scripts". The Stress Scripts provide cognitive, emotional and behavioral directions for reactions to stress situations. Participants identified their thought, feelings and behavior to help them cope with the situations more constructively. The reactions were then rehearsed through role-playing and imagery. The post test instruments were then administered to the subjects.

Table 1: Prepared post-treatment comparison of the subjects exposed to (SIT) and the control group using the - one - way analysis of covariance

(ANCOVA) Source of Variation	DF	SS	MS	F-ratio Obs.	F-ratio crit.	Test Decision
Between Group	7	165513.3	23644.76	62.19	2.05	Test Within Significant
Within Group	152	57793.1	380.22			
Total	159	223306.4	1404.44			
Critical Value	F(7,152)=2.05; P<0.05)					

The findings as depicted in table 1 showed that the compared pre and post treatment outcome following the one-way ANCOVA has the critical value $F(7,152) = 2.05$ $P < .05$ which thus indicated the existence of significant difference between subjects exposed to Stress Inoculations Training and those in the control group. Thus the experimental group manifested significantly decreases on test anxiety measures, while the control group did not.

Table 2: Adjusted X and Y means comparison of High/How Anxiety Groups in Stress Inoculation Training (SIT) and the control based on academic Performance

Variable & Categories	Pre-Test			Post-Test			Adjusted mean-Difference
	N	X	SD	N	Y	SD	
SIT (High Anxiety Level)	20	34.1	7.03	20	50.95	7.19	+46.85
SIT (Low Anxiety Level)	20	38.2	8.08	20	53.25	7.66	+15.05
Control (High Anxiety Level)	20	34.6	5.59	20	35.9	4.23	+1.3
Control (Low Anxiety Level)	20	38.2	8.59	20	39.85	6.67	+1.65

In table 2, the compared means - outcome for Stress Inoculation Training and the control group were juxtaposed as could be inferred from the table. Subjects in Stress Inoculation Training (SIT) exhibited better academic test performance due to reduced anxiety level than the control group. High means-scores in this case typified better academic performance.

4. Discussion

The results provide support for the use of cognitive-behavioral techniques in test anxiety management programs for adolescents. The data showed reduction in test anxiety as a result of the treatment program. These results following the treatment programs showed that the group which was exposed to experimental conditions indicated a mean-score of 50.95/53.25 for both

SIT (HAL) and SIT (LAL) as against the control groups where mean-scores of 35.9/39.85 CA (HAL) and CA (LAL) were obtained. Further reductions in the participants' level of anxiety were equally shown six weeks after termination of the treatment. A number of issues however should be considered, when evaluating these results. First, data were collected from two selected schools whose adolescents participated in the treatment program. All the eighty randomly selected adolescents attended all the eight training sessions and completed all data forms requested. Inspection of the means of post-evaluation revealed that the experimental group declined in their anxiety levels somewhat below that of the pre-treatment control group means. Large reduction in test anxiety level from post-treatment was not totally unexpected. One goal of the program was to provide training for adolescent test anxious individuals in self-management techniques whereby they deal with stress in small doses before it gets to uncontrollable level. Daily practice was emphasized and the adolescents were to continue using the techniques after completion of the eight training sessions. Though the low and high test anxious adolescents responded to treatment conditions, the high test anxiety adolescent responded to treatment better than their low test anxiety counterpart.

The result indicated that subjects in the Stress Inoculation Training Technique exhibited better academic test performance due to reduced anxiety level than those in the control group. Also the result corroborated with the findings of Meichenbaum (1972) and Holroyd (1976) who both found that Stress Inoculation Training was superior to relaxation training while the control group fail to show any treatment - gains.

This study has also demonstrated that collaborative research with investigators at different settings is possible and that it can be a useful approach to increasing the number of participants available in clinical outcome research and facilitating the generalizability of the findings. If collaborative researches and methodological precautions are taken, such as ensuring the standardization of treatment procedures, comparability of participants and equivalence of outcome measures, subjects would perform obviously well.

5. Conclusion

These past 30 years have witnessed a broad application of SIT to a variety of stressed populations, in both a treatment and a preventative manner. In each instance, the clinical application of SIT has been individually tailored to the specific target population and circumstances. It is the flexibility of the SIT format that has contributed to its robust effectiveness. It should also be apparent that SIT is a complex, multifaceted cognitive behavioral intervention that comprises incorporates key elements of nurturing a therapeutic working alliance with clients; psycho-educational features that include inductive Socratic discovery-oriented inquiry, collaborative goal setting that nurtures hope, and direct-action problem solving and acceptance-based-coping skills training that incorporates training generalization guidelines; relapse prevention; and self-attributional training procedures. In those instances in which clients have been victimized, SIT can be readily supplemented with symptom-specific interventions (e.g., cognitive-behavioral coping techniques to address physiological arousal, dissociation,

emotional dysregulation, and physical pain) and “memory work” such as imaginal and *in vivo* exposure-based techniques. From an SIT perspective, the treatment goal is not merely to have clients relive and retell their abuse histories but rather to have them consider the nature of the “stories” they tell both themselves and others as a result of such trauma exposure. SIT is designed to help clients consider the conclusions that they draw about themselves, the world, and the future as a result of such trauma experiences. SIT is designed to help clients construct a more adaptive narrative, and to change their view of themselves from “victims” to “survivors” to “thrivers.” The SIT concludes with a consideration of how to help clients find meaning or to transform their emotional pain into healing processes and activities and to learn how to reclaim their lives. Finally, SIT focuses on ways to ensure that such victimized individuals are not re-victimized.

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