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The effect of cognitive coping strategies on the tolerance of human infant crying

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THE EFFECT OF COGNITIVE COPING STRATEGIES ON THE TOLERANCE OF HUMAN INFANT CRYING

BY

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS
IN PSYCHOLOGY IN THE GRADUATE SCHOOL OF THE
UNIVERSITY OF RICHMOND

AUGUST 1980

Running Head: Infant Crying

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Acknowledgements

I would like to express my sincere appreciation to all those who assisted me in the preparation of this thesis. I am particularly grateful to Dr. Jaremko who, without his constant interest, guidance, and encouragement, this thesis would have never been completed.

I would also like to thank the other two members of the thesis committee. Dr. Kozub was invaluable in his help with the physiological equipment and the emergency repairs he performed on the equipment. I also appreciate the efforts of Dr. Blick for his daily concern and assistance in my graduate studies.

I would also like to extend my appreciation to all my fellow graduate students for their constant support and understanding. I am especially grateful to Robert Morriss and Helen McFalls for their assistance in the preparation of this manuscript and to Rita Wittmey for her sincere encouragement and confidence in my abilities.

Abstract

This study was an attempt to replicate and extend a pilot study which tested the efficacy of three cognitive coping strategies on the tolerance of human infant crying (Jaremko & Walker, 1978). Thirty-five male and female psychology students were divided into five groups: no-treatment control, attention placebo control, reversal of affect, distraction, and rationalization. In a pretest subjects listened to a ten minute tape of a crying infant and indicated when they first experienced an unpleasant feeling. The posttest was the same as the pretest, except the treatment groups were instructed to use a cognitive strategy to help them cope with the crying. Dependent measures consisted of: self report of discomfort and anxiety, length of tolerance, and heart rate. Results indicated an increase of tolerance across trials. Although treatment groups showed greater improvement than control groups across trials in discomfort and tolerance, the variability of these measures prevented the ruling out of chance effects.

The Effect of Cognitive Coping Strategies on the Tolerance of Human Infant Crying

The Aversive Nature of Infant Crying

Several recent experiments, studying the effects of infant crying, have found responses indicating that crying is perceived aversively by others (e.g., Donovan, Leavitt, & Balling, 1978; Frodi & Lamb, 1978; Frodi, Lamb, Donovan, Neff, & Sherry, 1978; Wiesenfeld & Klorman, 1978). Frodi et al. (1978), using a videotape of a crying infant, found that both mothers and fathers reacted negatively to this stimulus. That the crying was aversive, was supported by increases in: skin conductance, spontaneous fluctuations of skin conductance, and blood pressure (Frodi et al., 1978). Parents also reported more irritation, annoyance, distress, and disturbance when the crying stimulus was presented. Frodi and Lamb (1978) have also found similar responses in children and adolescents. Again there were increases in blood pressure, skin conductance, and heart rate. These children and adolescents also reported feeling less happy, more distressed, more irritated, and more sorry for the infant.

Other studies (Donovan et al., 1978; Wiesenfeld & Klorman, 1978) have used a silent videotape of a crying infant as the noxious stimulus. These studies have also found increases in skin conductance and self-reports of tension. These effects were exacerbated when the subject's own child was used as the aversive

stimulus. It appears that the two studies using silent videotapes (Donovan et al., 1978; Wiesenfeld & Klorman, 1978) tend to agree, in general, with the results of the sound videotapes (Frodi & Lamb, 1978; Frodi et al., 1978), but they do not support the aversive nature of crying as strongly, with a decelleration of the heart rate occuring with the presentation of the silent image of a crying infant. The reason for these less robust results may be due to the loss of an important cue in the silent tapes, i.e., the sound of the infant crying. The present study will investigate the aversive properties of the auditory aspects of human infant crying.

The Auditory Nature of Infant Crying as a Salient Cue

Harper (1971), reported that in a home environment, mothers elicited caretaker behavior 77% of the time to their crying infant. This behavior involved holding or feeding the infant and talking to the infant. When these mothers were removed to another room, it was found that they responded only 24% of the time to a light that indicated their baby was crying in an adjacent room. The importance of auditory cues over visual cues is demonstrated in a study observing that deaf parents did not attend to a crying infant, even if they could see that the infant was in distress (Lenneberg, Rebelsky, & Nichols, 1965). It has been suggested that the cry of a newborn infant is one of the more penetrating sounds made by human beings (Ostwald, 1973). It has a primary frequency of 500 Hz with its upper range at 1,000-2,000

Hz (Ostwald, 1972, 1973). This upper range corresponds to the most sensitive area of human hearing (Schiffman, 1976). Measurements also indicate that the intensity of crying is very high. The peak decibels, ten inches (2.5 cm.) away from the mouth of a crying infant, range from 80-85 decibels (Ostwald, 1972).

Sex Differences

It is clear that experimental evidence supports what is commonly known by many parents - crying can act as a very noxious stimulus. While no sex differences have been found in the physiological responses of parents or children to infant crying (Frodi & Lamb, 1978; Frodi et al., 1978); subjective self-report measurement indicate a greater reaction by females. Mothers' verbal reports tended to indicate more negative reactions than fathers' (Frodi et al., 1978). In addition, young teenage girls more often engaged in interactions with the crying infant than boys when they were given a choice (Frodi & Lamb, 1978).

A Theory of the Reaction to Infant Crying

It may be that people react to an infant's cry in the same way they react to other noxious stimuli. In addition to autonomic nervous system responses and self reports of anxiety (Frodi et al., 1978), there is an attempt to reduce the aversive stimulation (Murry, 1979). This behavior usually involves some type of physical contact, like holding or talking to the baby (Bell, 1971; Bell & Ainsworth, 1972). While it may be impossible

to determine exactly what subjective feelings occur when an individual hears an infant cry; it might be helpful to compare it with other psychological stresses or analogously to pain. Mallot and Whaley (1976), view pain as a series of four behavioral steps: 1.) physiological arousal, 2.) escape or avoidance, 3.) non-functional intermediate behavior, and 4.) self awareness that these events have happened and were caused by the painful stimulus. It may be theoretically useful to apply these same steps to an individual's reaction to a crying infant: 1.) increase in heart rate and skin conductance (Frodi & Lamb, 1978), 2.) holding the baby (Bell, 1971; Bell & Ainsworth, 1972), 3.) sighing and talking to self (Bell, 1971; Bell & Ainsworth, 1972), and 4.) complaints or self-reports of annoyance (Frodi & Lamb, 1978; Frodi et al., 1978). It may be that any interruption of this sequence will prevent the person from experiencing pain or discomfort.

Coping with Aversive Stimulation

There is considerable research dealing with pain and ways to cope with it (Chaves & Barber, 1976). Hypnotism has been used effectively, in some cases to reduce surgical pain (Chaves & Barber, 1976), and it has been suggested that the most important aspects in hypnotism may be relaxation and education of what to expect (Barber, Spanos, and Chaves, 1974). These latter components can be achieved without hypnotism (Barber et al., 1974). One procedure that does not

involve hypnosis has been the use of cognitive coping strategies. These procedures are relatively new concepts presently investigated by researchers as possible ways of helping people cope with pain without the use of drugs (Barber et al., 1974).

Attempts to define "cognitive coping strategy" have been difficult. The term "cognition" is frequently used in much of the recent psychological literature; but due to the inability to measure it directly with the existing instruments, one must take care to define what "cognition" means as it has different connotations. For the present purposes, "cognition" refers to any type of flow of covert ideas or internal thought processes that influence overt behavior.

This view of cognition is not unlike Meichenbaum's (1977) belief that cognitive strategies are self-talk, that become internalized. When internalized thought processes are used repeatedly, they are overlearned, becoming automated and abbreviated so that they appear instantaneous. Cognitive strategies can be triggered by both overt and covert discriminative stimuli, but once triggered, they appear automatic (Meichenbaum, 1976). The definition of coping involves a reduction in stress responding in comparison to a baseline reading. Coping can consist of a decrease in: autonomic arousal, in avoidance or escape responses (increase in tolerance), and in self reports of discomfort, when stressful stumuli are presented.

Jaremko (1978) tested three cognitive strategies used to cope with pain: distraction, relationalization, and reversal of affect. Distraction involves a task which asks the subject to think of something other than the uncomfortable situation. Rationalization consists of providing plausable reasons why a stressful situation should not be upsetting. Reversal of affect is trying to regard the stressful situation as pleasant. Jaremko (1978) found that the reversal strategy worked the best, while rationalization was also effective and distraction was least effective in increasing the threshold of cold water pain. Cold water pain is induced by immersing the hand in a bucket of ice water maintaining a temperature of about 3^{o} celsius. All three strategies were more effective than a no-treatment control group.

It may be that data from studies on the use of cognitive coping strategies in increasing pain tolerance and threshold can be generalized to the aversive stimulus of the crying human infant. Jaremko and Walker (1978), used the cognitive strategies of reversal of affect, rationalization, and distriction to help college students tolerate infant crying. These researchers found that the reversal strategy seemed to work best. However there were a number of problems in the Jaremko and Walker (1978) study that prohibited unequivocal conclusions. The study used twenty-two subjects, this small sample size reducing the power of the statistical test. There also was no placebo control group from which to compare

expectation effects. The present study will attempt to replicate the Jaremko and Walker study by using a larger sample and a placebo control group.

In summary, then, the crying of a human infant appears to be an aversive event that can be theoretically viewed in the same way as psychological stress or pain. Since some cognitive strategies have been shown to be effective in increasing stress or pain tolerance, these same methods may be effective in reducing negative reactions to infant crying. The present study will evaluate three cognitive coping strategies as compared to placebo and no-treatment control groups in reducing negative physiological and self report reactions to the crying of a human infant, as well as increasing the tolerance to the crying. In addition the separate effects of each sex will be evaluated.

It is hypothesized that cognitive coping strategies will increase tolerance of an auditory recording of an infant's crying. It is also predicted that the cognitive strategy of reversal of affect will work better than rationalization or distraction. Finally, it is expected there will be no sex differences in the physiological responses, although females will rate the crying as more uncomfortable.

Method

Subjects

Forty-nine male and forty-one female undergraduate psychology students were tested. Forty-seven male and twenty-six female students taking an introductory psychology course received one hour of experimental credit for participating in the experiment. The other subjects were volunteers who received no course credit for participation. A ceiling of ten minutes was set for the tolerance in the pretest. Fourteen males and six females reached this ceiling so they were dropped from the experiment. Subsequently, the data on thirty-five male and thirty-five female subjects was used on the ANOVAS.

Apparatus

A ten minute tape of a three month old crying infant was used as the noxious stimulus. This tape was played over a set of headphones with the peak decibels per minute ranging from 92 to 84 (see Appendix A). This was measured by a portable decibel meter of the type commonly used on stereo equipment. Heart rate was measured by a Lafeyette Heart Rate Monitor, Model 77065. Self report measurements were obtained from Spielberger's State Anxiety Inventory (see Appendix B), and a discomfort questionnaire (see Appendix C). A stopwatch was used to measure the length of time the subject tolerated the crying.

Procedure

Subjects were tested individually, both the pretest and posttest took place in the same session. All subjects were seated in a straight-back chair in a small experimental room. They all signed a release form explaining the procedures (see Appendix D). The heart rate monitor was attached to the left index finger of the subject. The subject was asked to keep his/her arms as still as possible. The experimenter informed the subject that he/she would be listening to a tape of an infant crying. The subject was asked to raise his/her right arm when annoyance or some other unpleasant feeling was first experienced (see Appendix E).

Pretest

The experimenter placed the headphones on the subject. Heart rate was recorded for three ten second baseline intervals before the tape was turned on, then for ten second intervals while the tape was playing, and for three ten second intervals after the tape was turned off. The subject then completed the state anxiety inventory and the discomfort questionnaire.

Posttest

The posttest procedure was the same as the pretest except, the subjects were given different instructions to help cope with the crying. There were five different sets of instructions: reversal of affect, rationalization, distraction, attention placebo control, and no-treatment control. Briefly, the instructions were as follows: The no-treatment control group was given no additional

new instructions. The attention placebo control group was told that there was often improvement in the ability to tolerate this type of discomfort on a second test. The rationalization group was told to think of reasons for why they were coping with the crying. The reversal of affect group was instructed to use imagery opposite to the annoying aspects of the crying. The distraction group was asked to think of anything other than the crying. (see Appendix F for posttest instructions).

The design of this experiment was a 5 X 2 X 2 (groups by sex by trials) factorial design with a repeated measure in one (the trials factor). Each dependent variable was analyzed separately with the 5 X 2 X 2 ANOVA. The dependent measures included: time of tolerance (in seconds), self-report discomfort ratings, state anxiety level, and heart rate (beats per minute). The data in the heart rate analysis used a difference score that attempted to be sensitive to autonomic nervous activity. The difference between the average of three baseline readings and the highest heart rate during the tape was used in the three way ANOVAS on the physiological data.

Results

The means and standard deviations for each of the five different treatments are summarized in Table 1. A Hartley's F Max test was performed for each separate ANOVA. None of these were

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insert Table 1 about here

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significant at the .05 level. Therefore it was assumed the variances were homogeneous. The summary tables for the groups by sex by trials analysis are presented in appendices G through J. Recall that the heart rate data represent a difference between the average baseline reading and the point of highest activity during the tape (the absolute value of the largest negative number was a constant added to all difference scores in order to make all numbers positive). A higher score on this measure represents a greater arousal response. The analysis of these data revealed no significant effects. However, the pretest scores of the attention placebo and rationalization for males and no-treatement for females were lower (non significantly). This suggests that group assignment may not have been random. The analysis of the state anxiety inventory data revealed no significant effects. There were no significant differences for the discomfort data. However, the direction of the means for the males shows that cognitive strategy groups evinced some improvement on posttest relative to the control groups. A similar pattern, but less consistent was found for the female's data on the discomfort rating. However, small n's and large variances make these results unreliable. Further, pretest differences looms large as a threat to internal

validity.

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insert figures 1 and 2 about here

The analysis of the tolerance data showed a main effect on trials ($f(1,60) = 10.91$, $p > .002$). However inspection of these data show that both males and females who received the treatment strategies showed more improvement than the control subjects. In fact the attention placebo group was the only control group that showed approachable significant improvement, but this group had the most extreme (lowest) scores. This "improvement" may have been the regression to the mean phenomena frequently seen in groups that score in an extreme direction (McNemar, 1969). Once again the pretest group's differences obscure interpretation of the data obtained in this study. Individual data for each of the dependent measurements can be found in Appendix K.

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insert figures 3 and 4 about here

Finally it should be noted that almost twice as many males as females reached tolerance ceiling in the pretest. This resulted in 29% of the males and 15% of the females being excused from further participation in the experiment. The difference between these two

proportions produced a z of 1.57 which was not significant at the .05 level.

Discussion

Although tolerance was found to increase significantly in the posttest, this improvement cannot be interpreted as support for the efficacy of the experimental treatments because the control groups also showed improvement. The trial by treatment interaction needed to show the differential effects of treatments was not found. Therefore, the hypothesis that the cognitive coping strategies would increase tolerance was not supported. However, visual inspection of the means indicates that the discomfort rating and tolerance measures appear to show treatment effects, but apparently the n's were too small and the variance of the measures too large to rule out possibility of chance as the cause of the effects. The hypothesis that there would be no physiological differences between males and females was supported. However, since there may have been pretest differences in the heart rate data, it is difficult to have confidence in the reliability of this measure. Although the means for the discomfort ratings indicate that females perceived the crying as more stressful, analysis did not find the difference large enough to rule out chance factors operating. Also twice as many males as females reached the ceiling on the pretest

indicating males may be more likely to deny the uncomfortable aspects of the crying than females. Once again, this difference does not reach an acceptable level of significance.

It appears that the reversal of affect and distraction instructions provided in this study produce the greatest improvement in coping behavior. This conclusion can be made on the basis of post hoc comparison but should be tempered because of the possibly questionable reliability.

The results and conclusions of this study are threatened by several methodological weaknesses. Perhaps most important is that the groups differed on the measures of the pretest. In the tolerance data, the attention placebo group had a much lower pretest mean, although this difference was not large enough to reach significance. The improvement in this group's posttest mean could well be a regression to the mean and therefore the effect of the cognitive strategy treatments would thus be obscured. Another problem in the study was that the number of words used in each of the instructions differed (see Appendix F). Any differences in the groups may be due to the length of the instructions rather than their content. Related to this problem is one in which the tape of the crying infant was not realistic enough to induce the stress that is generated by a live infant which is crying and needs care.

The physiological measurement of stress used in this experiment was also quite simple. More sophisticated measures of multiple channels is required for unequivocal evaluation of physiological effects. This would involve equipment capable of uninterrupted monitoring of a variety of physiological responses, and the recording of these responses continuously.

Even though the present study was a replication of a previous study (Jaremko & Walker, 1978), the idea of using coping techniques is relatively new and therefore there are few researches bearing on it. The present study can be considered exploratory and trends obtained are worthy of additional research vis a vis the threats to the internal validity that were already mentioned. Future research in this area should attempt to increase the power of the test by using a larger sample size or by changing to a within subjects design.

This study and the one it attempted to extend and replicate, while unequivocal, yielded consistent results. It is premature to conclude that cognitive coping strategies can aid in increasing tolerance of infant crying, nonetheless it appears to be a promising question for further research. Indeed, the present study and ones like it can lead to the development of multicomponent treatment packages for the use in child rearing related problems. It may be that clinical research will show that stress inoculation

training (Meichenbaum and Jaremko, 1980) can be helpful in reducing child-abuse. Studies that can demonstrate the most efficient use of the components within such treatment packages can be justified on the basis of clinical utility. The present study has attempted to reach this goal with mixed results. Further work along these lines seems encouraging.

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Table 1

Means and Standard Deviations of All

Measures in All Groups, Pretest and Posttest

Groups	Heart Rate		STAI		Discomfort		Tolerance	
Male	$\bar{X}$	Sd	$\bar{X}$	Sd	$\bar{X}$	Sd	$\bar{X}$	Sd
NT								
Pre	15.42	17.62	38.14	7.40	45.71	22.81	126.43	122.50
Post	14.71	9.19	40.43	9.60	47.86	24.30	102.85	52.89
AP								
Pre	6.71	4.21	40.86	9.01	52.86	19.12	59.43	39.00
Post	11.14	13.29	41.14	14.51	59.00	22.55	79.86	72.90
RAT								
Pre	6.43	4.40	38.43	37.71	55.71	31.01	78.43	135.81
Post	14.57	5.47	37.76	15.81	50.00	36.06	130.14	161.43
REV								
Pre	11.21	6.01	36.71	9.88	42.86	21.38	91.29	118.12
Post	12.14	9.48	35.28	7.78	32.86	2.59	159.86	205.05
DIST								
Pre	15.86	12.84	40.29	8.30	52.86	17.00	117.43	142.52
Post	18.43	15.93	42.14	13.03	47.14	24.30	146.14	202.29
Female								
NT								
Pre	6.43	4.32	40.57	7.11	66.43	22.49	104.28	101.67
Post	8.43	6.32	41.57	6.10	60.71	22.07	116.00	137.63
AP								
Pre	11.00	5.66	42.71	9.01	64.29	19.67	25.86	22.61
Post	9.86	7.38	43.28	8.63	63.57	25.77	46.14	45.67
RAT								
Pre	9.00	6.00	33.00	5.83	41.42	24.10	53.71	71.28
Post	7.42	.98	35.42	6.34	41.43	19.51	58.28	36.28
REV								
Pre	15.14	14.31	41.57	7.14	63.57	17.49	110.43	129.46
Post	17.43	15.96	46.00	9.05	55.71	12.72	155.29	192.76
DIST								
Pre	13.86	4.63	35.85	6.47	54.29	19.88	113.57	117.42
Post	13.00	6.35	37.14	4.71	50.71	24.57	192.43	216.65

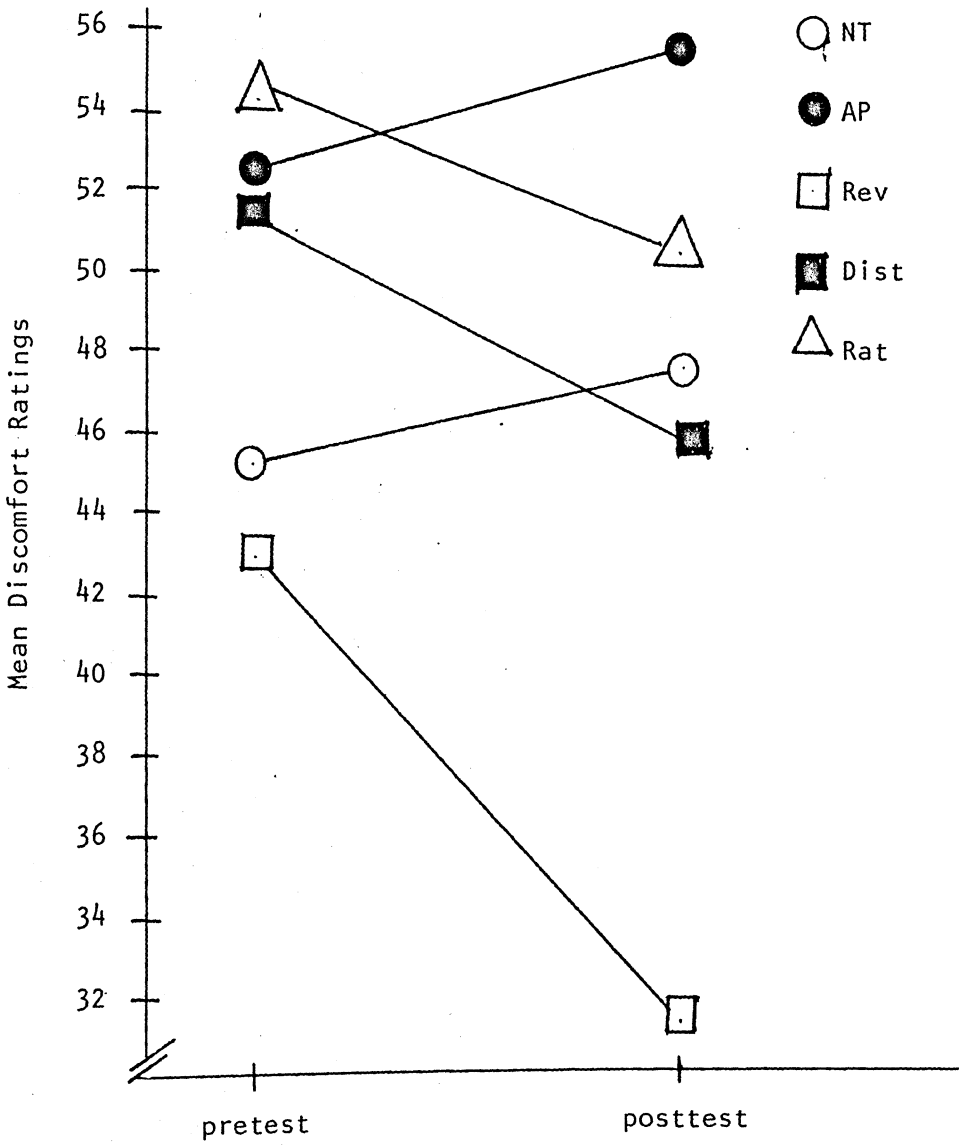

Figure 1

Males Mean Discomfort Ratings,

For Each Treatment, Pretest and Posttest

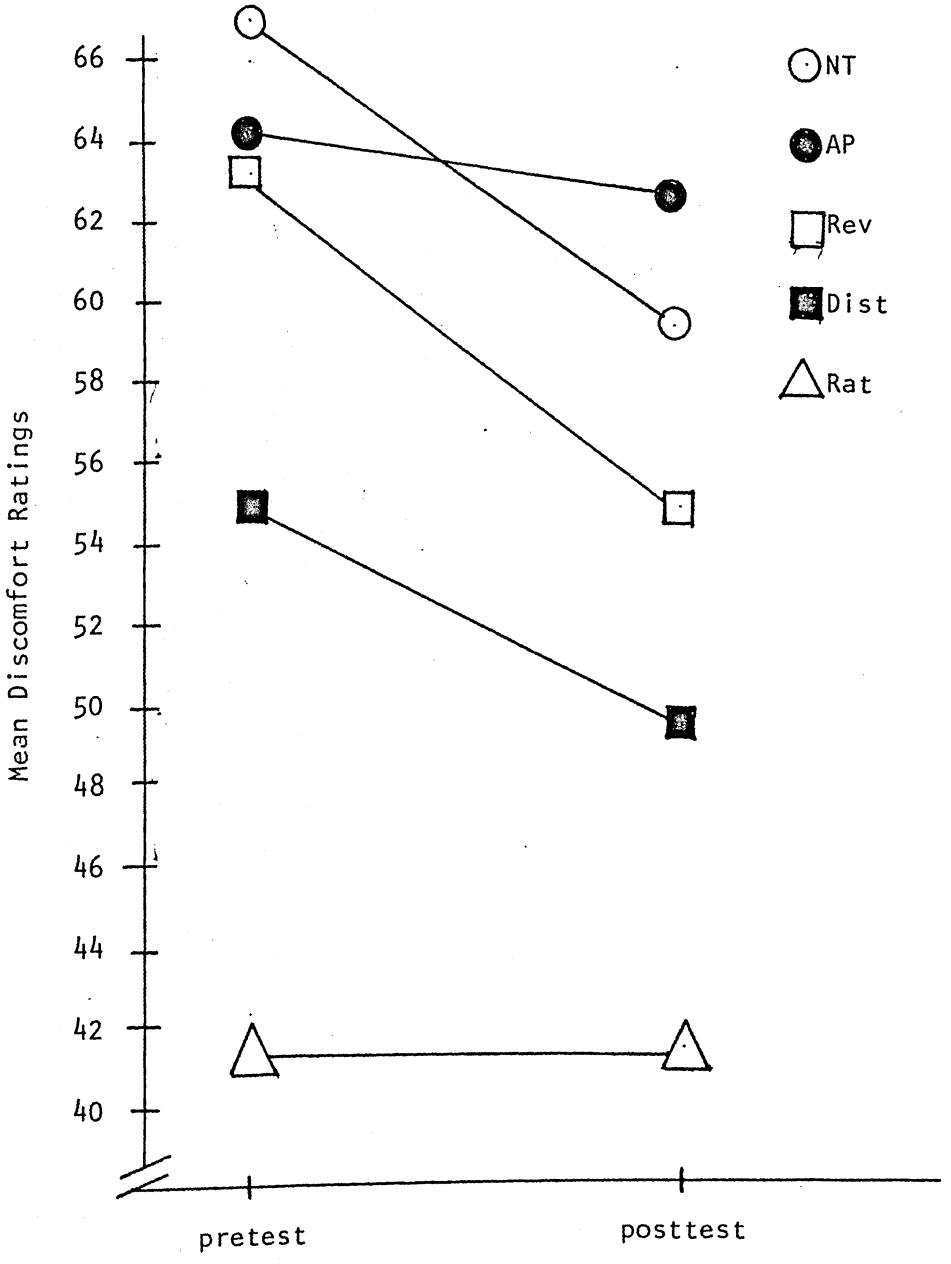

Figure 2

Females Mean Discomfort Ratings,

For Each Treatment, Pretest and Posttest

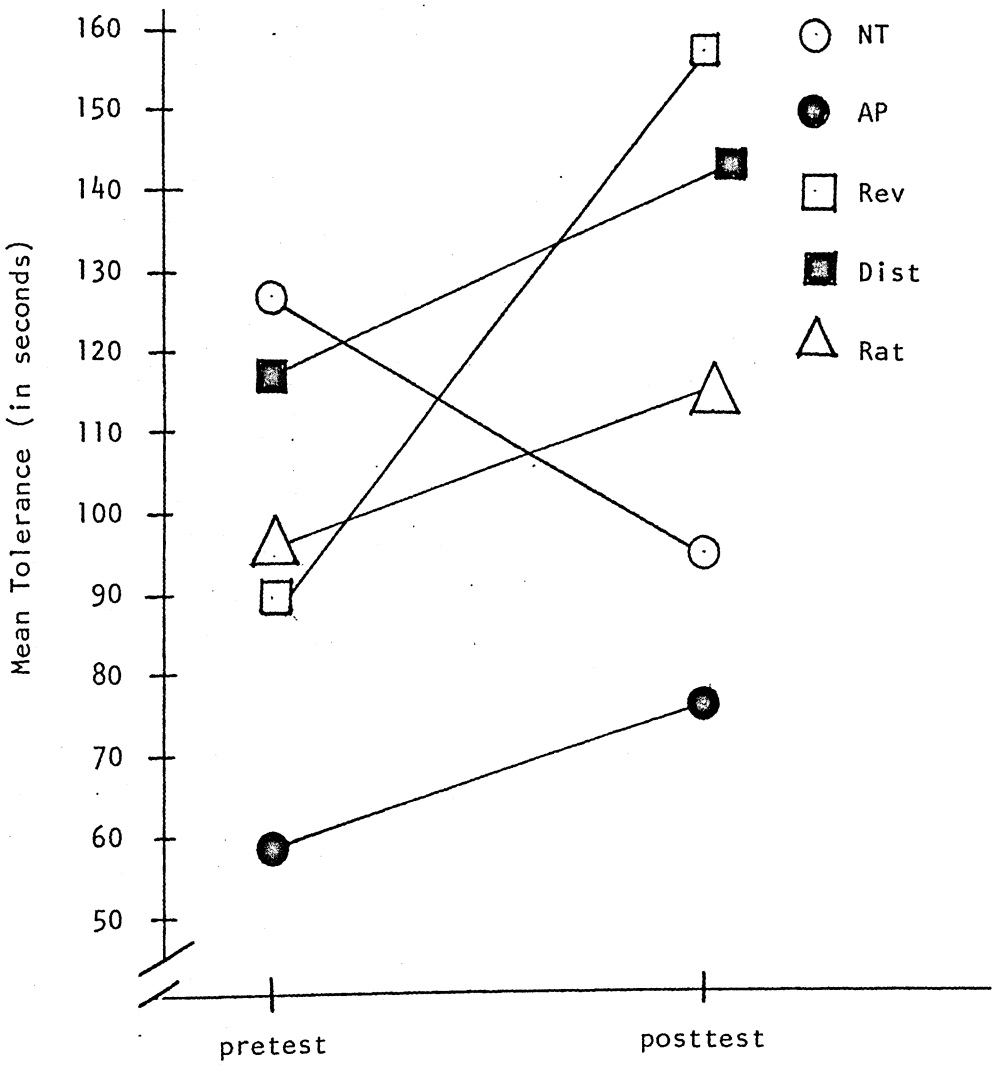

Figure 3

Males Mean Tolerance (in seconds)

For Each Treatment, Pretest and Posttest

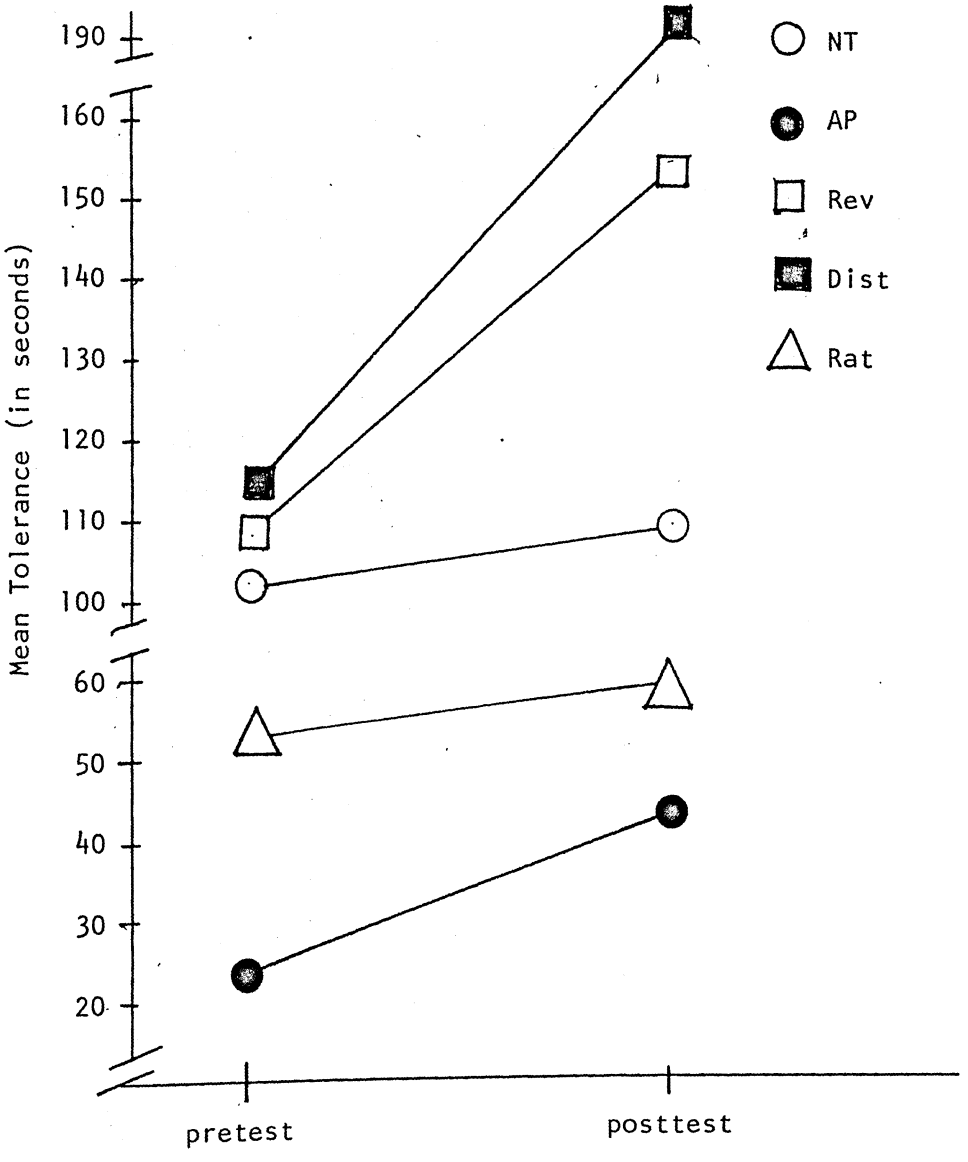

Figure 4

Females Mean Tolerance (in seconds)

For Each Treatment, Pretest and Posttest

Appendix A

Maximum decibel per minute on crying infant tape

Minute	Decibel	Number of Times Reached
1	90	3
2	90	2
3	88	1
4	90	1
5	92	2
6	84	2
7	92	2
8	88	1
9	88	1
10	86	1

Appendix B

SELF-EVALUATION QUESTIONNAIRE

Developed by C.D. Spielberger, R.L. Gorsuch and R. Lushene

STAI FORM X-1

NAME_____ Date_____

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you *feel* right now, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

		Not at all	Some-what	Moder-ately so	Very much so
1.	I feel calm	(1)	(2)	(3)	(4)
2.	I feel secure	(1)	(2)	(3)	(4)
3.	I am tense	(1)	(2)	(3)	(4)
4.	I am regretful	(1)	(2)	(3)	(4)
5.	I feel at ease	(1)	(2)	(3)	(4)
6.	I feel upset	(1)	(2)	(3)	(4)
7.	I am presently worrying over possible misfortunes	(1)	(2)	(3)	(4)
8.	I feel rested	(1)	(2)	(3)	(4)
9.	I feel anxious	(1)	(2)	(3)	(4)
10.	I feel comfortable	(1)	(2)	(3)	(4)
11.	I feel self-confident	(1)	(2)	(3)	(4)
12.	I feel nervous	(1)	(2)	(3)	(4)
13.	I am jittery	(1)	(2)	(3)	(4)
14.	I feel "high strung"	(1)	(2)	(3)	(4)
15.	I am relaxed	(1)	(2)	(3)	(4)
16.	I feel content	(1)	(2)	(3)	(4)
17.	I am worried	(1)	(2)	(3)	(4)
18.	I feel over-excited and "rattled"	(1)	(2)	(3)	(4)
19.	I feel joyful	(1)	(2)	(3)	(4)
20.	I feel pleasant	(1)	(2)	(3)	(4)

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Appendix C

Discomfort Thermometer

Please use the "discomfort thermometer" to rate the maximum amount of discomfort you experienced while you were being exposed to the crying. Circle the number which you think applies to your level of discomfort.

100	extremely uncomfortable
90	
80	uncomfortable
70	
60	
50	moderately uncomfortable
40	
30	
20	slightly uncomfortable
10	
0	not comfortable

Describe any scenes or images you used in order to divert your attention from the discomfort.

1.)

2.)

3.)

Appendix D

Tom Mann has fully explained my participation in this experiment. I am fully aware of the following points and wish to volunteer to participate.

1. My heart rate will be measured prior to, during, and after the playing of the tape.
2. I will be asked to fill out a questionnaire, rating the amount of discomfort I felt during the crying.
3. After additional instructions, the same measurements will be taken when the tape is played a second time.
4. All information from this experiment will become the property of the psychology department and will be directly assessable only to those involved with the project.

   Confidentiality will be assured. All data will be reported without names. Results from this experiment can be obtained from Tom Mann or his faculty supervisors at the end of the semester.
5. I may terminate my participation in this experiment at any time.

_____ _____

SIGNATURE OF PARTICIPANT DATE

_____

WITNESS

Appendix E

Pretest Introduction

The purpose of this experiment is to test the effect a crying infant has on people and the different ways they cope with it. In a few minutes a heart rate monitor will be attached to your left index finger. A tape recording will be played over these headphones. When you first experience some unpleasant feeling in response to noise, like annoyance, raise your right arm and I will turn the tape off. Do you understand these instructions? ... Could you repeat them for me so that we may avoid any misunderstandings? ... When I say Now!, please keep your arms as still as possible, especially your left arm. Any movement could affect the accuracy of the recordings...Now!

Appendix F

Posttest Instructions

No-Treatment. This time we want to see how accurate our first test was. As before, raise your right arm when you first feel annoyance or some other unpleasant feeling. When I say Now!, please remain as still as possible...Now!

Attention Placebo. When people encounter an uncomfortable situation a second time, it is found that they adjust to it more readily. In previous studies to this, marked improvement in the ability to tolerate the discomfort was found when the uncomfortable situation was presented for the second time. As before, raise your right arm when you first feel annoyance or some other unpleasant feeling. When I say Now!, please remain as still as possible...Now!

Reversal of Affect. When people are put in uncomfortable situations similar to this, using imagery emphasizing the positive aspects of the situation increases tolerance. So this time I want you to think of the crying as positive for the infant. Think of the infant lying in the crib. It is crying, but the pleasant expression on its face shows that it is not mad at you or trying to upset you. The baby is trying to communicate in the only way it knows that it is only hungry or lonely. You will find that this technique is particularly effective the more involved you are with

this image. As before, raise your right arm when you first feel annoyance or some other unpleasant feeling. When I say Now!, please remain as still as possible...Now!

Rationalization. When people are put in uncomfortable situations similar to this, they tolerate it better if they consider the reason why they are in that situation. This time I want you to think about your psychology class and how participating in this experiment helps fulfill the requirement for experimental credit. You will find that this technique is particularly effective the more involved you are with this image. As before, raise your right arm when you first feel annoyance or some other unpleasant feeling. When I say Now!, please remain as still as possible... Now!

Distraction. When people are put in an uncomfortable situation similar to this, they tolerate it better if they distract themselves by directing their attention to something other than the uncomfortable situation. So this time I want you to think about your favorite teacher. You are sitting in the class listening to an excellent lecture. You are so absorbed by the new and exciting ideas that you are aware of nothing else. You will find that this technique is particularly effective the more involved you are with the image. As before, raise your right arm when you first feel annoyance or some other unpleasant feeling. When I say Now!, please remain as still as possible...Now!

Appendix G

Summary Table of Heart Rate ANOVA

Source of Variation	DF	Mean Square	F	Prob.
Within				
TRL	1	89.60	2.42	.13
SEX x TRL	1	74.31	2.01	.16
TRT x TRL	4	7.55	.20	.94
SEX x TRT x TRL	4	45.55	1.23	.31
RESIDUAL (error)	60	37.05		
Between				
SEX	1	80.26	.59	.44
TRT	4	193.87	1.43	.23
SEX x TRT	4	155.95	1.15	.34
ERROR	60	135.57		

Appendix H

Summary Table of Tolerance ANOVA

Source of Variation	DF	Mean Square	F	Prob.
Within				
TRL	1	32803.20	10.91	.002
SEX x TRL	1	72.86	.02	.87
TRT x TRL	4	4663.44	1.55	.20
SEX x TRT x TRL	4	2844.88	.95	.44
RESIDUAL (error)	60	3006.24		
Between				
SEX	1	4698.00	.15	.69
TRT	4	37567.44	1.21	.31
SEX x TRT	4	5802.28	.19	.94
ERROR	60	30930.65		

Appendix I

Summary Table of STAI ANOVA

Source of Variation	DF	Mean Square	F	Prob.
Within				
TRL	1	50.40	1.94	.16
SEX x TRL	1	19.31	.74	.39
TRT x TRL	4	1.99	.08	.99
SEX x TRT x TRL	4	15.40	.60	.67
RESIDUAL (error)	60	25.00		
Between				
SEX	1	12.60	.09	.76
TRT	4	129.58	.93	.45
SEX x TRT	4	180.44	.29	.28
ERROR	60	139.67		

Appendix J

Summary Table of Discomfort ANOVA

Source of Variation	DF	Mean Square	F	Prob.
Within				
TRL	1	428.75	2.90	.09
SEX x TRL	1	.17	.00	.97
TRT x TRL	4	90.80	.61	.65
SEX x TRT x TRL	4	48.84	.33	.85
RESIDUAL (error)	60	147.92		
Between				
SEX	1	2200.18	2.43	.12
TRT	4	647.59	.72	.59
SEX x TRT	4	1188.13	1.32	.27
ERROR	60	902.51		

Appendix K

Heart Rate, Tolerance, STAI, and Discomfort

Data for Each Subject

Groups	Subj.	Pretest				Posttest			
		H.R.	Tol	STAI	Disc	H.R.	Tol	STAI	Disc
Male									
NT	1	4	32	43	85	22	66	43	85
	2	10	135	38	60	- 2	137	40	50
	3	3	155	36	25	14	153	40	50
	4	42	70	44	50	28	59	41	40
	5	40	380	48	50	19	116	58	75
	6	4	95	28	20	5	165	26	20
	7	5	18	30	30	13	30	35	40
AP	1	2	60	52	70	11	8	54	80
	2	6	138	29	50	13	141	25	30
	3	6	67	46	60	15	216	56	80
	4	7	28	29	25	5	44	26	25
	5	16	16	46	75	13	32	33	50
	6	8	68	50	60	12	61	58	70
	7	2	39	34	30	9	57	36	50
REV	1	5	5	23	70	3	10	26	50
	2	20	350	29	10	31	600	30	10
	3	14	70	33	30	14	97	39	30
	4	18	78	53	70	12	200	33	10
	5	6	70	39	40	7	131	32	20
	6	8	68	50	60	12	61	58	70
	7	2	39	34	30	9	57	36	50

Groups	Subj.	Pretest H.R.	Pretest Tol	Pretest STAI	Pretest Disc	Posttest H.R.	Posttest Tol	Posttest STAI	Posttest Disc
Male (continued)									
DIST	1	41	124	49	80	32	84	59	90
	2	25	434	44	50	43	600	41	40
	3	11	45	48	60	4	53	60	70
	4	6	72	35	60	21	125	35	40
	5	6	56	26	39	4	57	26	40
	6	9	55	36	60	19	73	32	30
	7	13	36	44	30	4	31	42	20
RAT	1	8	7	27	80	12	69	37	90
	2	14	383	36	20	21	487	34	10
	3	3	56	33	10	14	65	23	00
	4	2	10	40	90	22	13	57	90
	5	10	43	41	60	14	73	34	50
	6	4	7	40	50	13	67	20	40
	7	4	43	52	80	6	137	59	70
Female									
NT	1	13	5	34	80	1	5	38	80
	2	4	221	36	50	7	220	36	60
	3	0	65	59	80	21	47	52	70
	4	4	70	51	40	8	75	46	30
	5	10	3	41	95	11	4	40	75
	6	8	105	36	80	6	80	44	80
	7	6	271	36	40	5	381	35	30

Groups	Subj.	Pretest H.R.	Pretest Tol	Pretest STAI	Pretest Disc	Posttest H.R.	Posttest Tol	Posttest STAI	Posttest Disc
Female (continued)									
AP	1	16	10	50	60	1	8	46	40
	2	12	17	53	95	18	15	50	95
	3	9	15	47	75	19	27	41	75
	4	18	30	30	30	11	70	28	20
	5	1	26	31	60	10	46	39	75
	6	8	9	46	60	0	18	44	60
	7	13	74	42	70	10	138	55	80
REV	1	9	10	47	80	14	9	55	60
	2	8	10	35	80	6	31	35	50
	3	45	310	48	60	50	484	57	80
	4	4	18	40	60	16	65	36	40
	5	8	222	42	60	3	381	44	50
	6	10	3	30	75	9	70	42	50
	7	22	200	49	30	24	47	53	60
DIST	1	14	205	37	30	25	308	40	50
	2	18	272	40	50	14	516	32	20
	3	16	39	24	50	9	44	31	75
	4	20	234	33	50	17	420	43	40
	5	13	15	33	40	8	19	34	30
	6	8	10	42	90	11	10	40	90
	7	8	20	42	70	7	30	40	50

Groups	Subj.	Pretest H.R.	Pretest Tol	Pretest STAI	Pretest Disc	Posttest H.R.	Posttest Tol	Posttest STAI	Posttest Disc
Female (continued)									
RAT	1	4	69	22	10	8	95	22	10
	2	8	33	35	30	6	48	41	50
	3	4	6	35	60	7	12	39	70
	4	21	4	34	80	8	19	36	50
	5	11	52	34	40	7	108	34	30
	6	5	7	30	50	7	74	37	50
	7	10	205	41	20	9	52	39	30

VITA

Thomas C. Mann was born on August 10, 1957, in Cheverely, Maryland. After living in Greenbelt, he moved with his family to New Carrollton, Maryland, a suburb of Washington, D.C. He attended Largo High School in Largo, Maryland and graduated in 1975. He then studied at Wake Forest University in Winston-Salem, North Carolina. In his freshman year, he became a member of Theta Chi, a social fraternity at the University. He majored in psychology and graduated Cum Laude in 1979. In the fall of 1979 he entered the Graduate School, Department of Psychology, at the University of Richmond and expects to receive his Master of Arts degree in August 1980. Upon completion of his studies at the University of Richmond he plans to work in the Richmond area before resuming his studies.