

Brief Progressive Relaxation Training as a Function of Locus
of Control and Experimenter-Cued Feedback with Pregnant
Women

by



H. Richard Griffin

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presented to the University of Manitoba
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ABSTRACT

The literature on locus of control and biofeedback yields inconclusive results but tends to favor internals as more effective at achieving physiological self control. However, externals had not been provided with externally-based feedback in most of these studies. The present study, therefore, compared progressive relaxation and experimenter-cued feedback on progressive relaxation as a function of two measures of locus of control, Rotter's IE Scale and Reid and Ware's Self Control Scale. In addition, these two scales were used as predictors of adjustment to pregnancy, labor and delivery.

Subjects were 95 volunteer primiparae pregnant women, enrolled in prenatal courses. Following the completion of a prenatal questionnaire, both locus of Control scales, and Spielberger's A-State and A-Trait Scales, women were randomly assigned to one of four groups: Progressive Relaxation; Experimenter-Cued Feedback; Control I, sitting in silence; and Control II, filling out questionnaires but not participating in the experimental session. Frontalis EMG and A-State measures were taken as indicators of tension reduction. Following delivery subjects returned a postpartum questionnaire tapping obstetrical issues.

Results were generally unresponsive of the hypotheses. There were no significant differences between internals and externals on either relaxation method, while obstetrical measures were not significantly related to the IE Scale. However, internals on the Self Control Scale did have more positive pregnancies than externals. A number of post hoc findings were interesting, in particular, that overall, externals showed more tension reduction than internals, a finding opposite to predictions. In addition, the IE and Self Control Scales seem to be tapping different dimensions, with IE tending to be more predictive of physiological self control and Self Control more related to obstetrical measures, while considering the two scales together yielded a significant interaction on ease of delivery.

Findings were discussed as supporting the concept that the structure of the task seems a more crucial issue than whether internals or externals exhibit greater physiological self control. Suggestions are made for further research with the Self Control Scale and in obstetrical research.

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INTRODUCTION

The present study involved the combination of two areas of research: 1) locus of control, more specifically, the interaction of locus of control and type of feedback in relaxation training; and 2) the general area of childbirth, training for childbirth, and complications of childbirth. A brief overview is presented below to describe the conceptual reasoning of the study followed by a literature review of the relevant areas.

Previous studies investigating the relationship between locus of control and control of physiological functioning, whether through biofeedback or progressive relaxation, have generally not provided optimal conditions for external locus of control subjects. These conditions are that information regarding performance on physiological self control needs to be provided for externals from a source that is clearly directed by someone else and in a way that is meaningful to an external frame of reference. The present study aimed at providing these conditions while training subjects at progressive relaxation.

Pregnant women were used in the study because most major schools of preparation for childbirth use some form of pro-

gressive relaxation, and the ability to attain and achieve muscular relaxation is important for reducing pain in childbirth. Also, by using pregnant women in a training procedure related to childbirth preparation, it was expected that the motivational level would be higher relative to typically-used university subjects who often provide no assurance of sufficiently high motivation toward the experimental task.

In addition to the above manipulation, data were gathered relating locus of control to actual childbirth conditions such as length of labour, amount of medication used, and pregnancy and delivery complications. The gathering of these data was viewed as exploratory research investigating locus of control and psychosomatic aspects of obstetrics, areas which fit together conceptually yet have rarely been studied.

Rotter (1954, 1975) outlines three major determinants of behaviour potential as described by his social learning theory. The first of these is the expectancy that the behaviour will lead to a particular reinforcement. This expectancy is a function of the person's past experiences in that situation (specific expectancies) as well as experiences in situations which the person perceives as similar (generalized expectancies). The relative importance of specific versus generalized expectancies varies according to

the novelty or familiarity of the situation. As the situation becomes more novel or ambiguous, the relative importance of a person's generalized expectancy increases, just as it decreases if the person has had previous experience with that situation or the parameters are very clear. Rotter's (1966) Internal-External Locus of Control Scale was designed as a measure of generalized expectancies for reinforcement and therefore is most applicable in situations which are novel or ambiguous. If predictions based upon the I-E Scale were made in situations which are familiar to the subjects or where the parameters are very clear, the predictive validity of the scale would be decreased.

The second determinant of behaviour is the value of the available reinforcements in which a given behaviour results. This variable is crucial to social learning theory, and other behaviour theories, yet many studies fail to take it into account in considering locus of control. As Rotter (1975) states: "Without doubt, the most frequent conceptual problem on the part of a number of investigators is the failure to treat reinforcement value as a separate variable (p. 59)." Rotter cites studies such as those by Seeman and Evans (1962) and Gore and Rotter (1963), in which motivation of subjects was assured by common concerns over tuberculosis or civil rights activism, as examples of assuming a high motivational level for all subjects toward the same goals. To use social learning theory and locus of control scales

adequately, research must account for motivation of subjects by controlling or manipulating reinforcement value.

The third behavioural determinant that Rotter specifies is the psychological situation, which has an effect on both expectation and reinforcement value. To predict behaviour potential, not only must the psychological situation be specified but also there must be some evaluation of the alternative behaviours available to the individual in that situation.

To be justified in using Rotter's I-E Scale or other general measures of locus of control as predictors of behaviour, a study must therefore involve a novel or ambiguous situation; must assure a high level of motivation across all subjects, thus controlling for reinforcement value; and must assess or control alternative behaviours in that situation.

The present study attempted to meet these requirements. The subjects used were primiparae pregnant women who had therefore never been through childbirth or childbirth training before. The present experiment was concerned with an important aspect of childbirth training and childbirth itself, relaxation training, therefore it dealt with a subject that pregnant women are very concerned about. And finally, the experimental situation was a laboratory setting, where alternative behaviours are minimized. In examining specifically the area of physiological self control

with regard to locus of control, the format of the self control tasks is crucial to determining whether or not internals differ from externals in their self control ability. That is, the source of feedback provided must include that which would be theoretically accessible to externals as well as internals before differential abilities at self control can be determined. According to the locus of control construct, externals would be expected to look at external sources for performance appraisal, while internals would be likely to use their own evaluation as an indication of performance. The present study varied the source of performance information providing conditions of internally-based feedback and externally-cued feedback in an attempt at examining physiological self control within the theoretical parameters predicted by the locus of control construct. By meeting Rotter's (1975) criteria, the present study hoped to identify factors which would allow for more specific training methods of relaxation. That is, if the locus of control construct can discriminate which women are successful at relaxation and if different forms of feedback can improve this success, then it may be useful to include this dimension in assessments to determine the best relaxation approach for a specific individual in other applications besides childbirth preparation, rather than simply applying the same method to all subjects. A review of the relevant literature in locus of control, self control of physiological functioning, and obstetrical factors follows.

Locus of Control

One of the most important products of Rotter's (1954) social learning theory has been the concept of locus of control. Briefly, this construct is seen as an enduring and measurable personality characteristic which considers the generalized expectancy a person has as to the degree of control over what happens to himself or herself. Internal locus of control individuals perceive reinforcements and punishments that they receive as consequences of their own actions and therefore subject to their control, while external locus of control individuals view events and reinforcements as beyond their personal control and responsibility, being determined instead by external forces within the environment.

A great deal of research has been conducted on the locus of control construct. It will not all be reviewed here, as reviews may be found by Rotter (1966), Lefcourt (1966), Joe (1971), Throop and MacDonald (1971), and MacDonald (1973). Studies relevant to the present research will be discussed below. As evidence toward the generality of the locus of control construct, studies in a number of different areas have shown a differential response between internals and externals in performance of tasks, reactions to social influence, and attempts at self control.

Rotter (1966) originally hypothesized that internals would perform better under conditions perceived as being dependent upon the skill of the performer, hence being under their control, while externals would perform better under conditions perceived as determined by chance. Several studies have dealt with this area (Julian & Katz, 1968; Lefcourt, Lewis & Silverman, 1968; Rotter & Mulry, 1965) but not in a consistent or systematic way. However, it appears that there is at least minimal support for differential performance on chance versus skill tasks on the basis of locus of control orientation (Joe, 1971).

Similarly, it has been reported that internals and externals respond differentially to social stimuli applied to influence attitudes or behaviour, with internals seen as more resistant to environmental manipulation in studies by Getter (1966), Pichie and Phares (1969), and Strickland (1970). However, research by Baron (1969), Klemp (1969), and Lichtenstein and Craine (1969), found no difference between internals and externals on this issue. It appears, in fact, that response to manipulation may be more a function of the manner in which the manipulation is presented than the locus of control of the subjects. Sherman (1973) studied attitude change in internals and externals under conditions in which subjects were either forced to follow discrepant behaviour (writing counterattitudinal essays) or exposed to persuasive messages. He found an interaction

between locus of control and influence technique used, with externals changing their attitudes more when subjected to persuasive communications, while internals changed more after writing a counterattitudinal essay. Sherman interprets these results as indicating that internals "... attribute greater responsibility to themselves for the consequences of their acts (p. 26)." Other studies reporting similar results are those by Gore (Note 2) and Ritchie and Phares (1969).

Basically, these results fit logically into the locus of control construct. Internals reportedly feel responsible for their actions and feel superior in dealing with their environment. They do not expect, in fact appear to resist, external manipulation, preferring instead to rely upon themselves for reinforcement. Externals do not feel responsible for their actions, they look for external influence and respond to it when provided more readily than do internals. In applying these concepts, it would appear that internals would be more influenced by situations in which the parameters provided for internal reinforcement, while externals would respond best when something or someone in the environment provided the reinforcement.

In an important series of studies, Baron and Ganz (1972) and Baron, Cowan, Ganz, and McDonald (1974) demonstrated the above concept by varying the manner in which reinforcement

was provided in response to task performance. They were interested in the efficacy of "intrinsic" and "extrinsic" feedback upon form discrimination with internals and externals. Intrinsic feedback was provided by having success feedback conveyed through self discovery--e.g., the subjects were allowed to see for themselves if their choices were correct, while extrinsic feedback was provided by the experimenter conveying the accuracy of choices but not allowing the subject to confirm this accuracy himself. By varying the manner of feedback, a strong interaction effect was found between feedback and locus of control, with internals consistently performing better under intrinsic feedback and externals doing so under extrinsic feedback. Baron et al. (1974) replicated these results with two different populations using different tasks and different measures of locus of control (Virginia Crandell's Intellectual Achievement Responsibility Questionnaire and Rotter's IE Scale). The results consistently supported the interaction between source of feedback and locus of control. These authors interpreted their results as demonstrating that differential response between internals and externals is a function of the interaction between trait and situation effects, rather than simply situational as had often been assumed.

The implications of these studies for the present research are crucial, for it would seem that performance on a variety of tasks is a function of the source of feedback

provided as well as locus of control, and more significantly, that externals perform best when extrinsic reinforcement is provided. Also important for the present study was the finding by Baron and Ganz (1972) that a combined condition, where feedback was provided both intrinsically and extrinsically, attenuated any differences in performance between internals and externals while still yielding a high level of performance.

In related studies, Bellack (1972) and Bellack and Tillman (1974) manipulated the type of feedback provided for internals and externals on a recognition memory task. They provided subjects with self reinforcement, in which the subject evaluated his own performance, or external evaluation, where the experimenter provided feedback on performance. They found that, following external evaluation, internals were more accurate in their self reinforcements than externals, although this difference was not present before external evaluation. These results were interpreted as demonstrating that internals were able to both evaluate their own performance and use outside evaluation, while externals tended to rely just on external evaluation, not trusting or deemphasizing their own judgement of their performance.

Locus of Control and Self Control

While much of the research on locus of control has been concerned with the interaction between individuals and their environment, there is evidence accumulating which indicates that the locus of control dimension is related to self control as well. James, Woodruff, and Werner (1965) and Straits and Sechrest (1963) showed that individuals who smoke were more external than those who did not, and that a more internal orientation was reported among those who stopped smoking following the Surgeon General's report linking smoking to cancer, provided they reported believing the report. Also, Phares, Fitchie, and Davis (1968) found that internals were more willing to overcome perceived personality problems than externals. MacDonald (1970) reports that internals were more likely to practice birth control than externals. Similar findings have been reported for successful weight reduction (Balch & Ross, 1975) and for the taking of voluntary influenza inoculations (Dabbs & Kirscht, 1971). The general trend of this research points toward internals having better self control than externals, given the reinforcement parameters existing in the conditions examined (Joe, 1971).

Control of Heart Fate

In an extension of the relationship between locus of control and self control, Fotopoulos (1970) argued that, since

locus of control is viewed as a generalized personality characteristic, it would seem reasonable to apply it to situations demanding physiological control. She states: "Indeed, if there exists 'internal' or 'self' control, then it should not be limited to social behaviour, but should also have an effect on physiological processes (p. 2)." Presenting subjects with a task of increasing their heart rate, Fotopoulos varied conditions of "thinking" (e.g., no feedback), information feedback (provided through a display by oscilloscope of heart rate), and external stimulus (a metronome was set at a faster pace than heart rate and subjects were instructed to try to match their heart rate to its beat) between internal and external subjects. In addition, half of the subjects received reinforcement on the feedback trials in the form of an experimenter-operated buzzer which sounded when heart rate was successfully increased for three successive beats. She hypothesized that internals would function more effectively under conditions in which they had the most influence in determining their behaviour - e.g., thinking and nonreinforced information feedback conditions, while externals were expected to perform best in situations which allowed external influence, that is, the external stimulus situation and both feedback conditions with reinforcement. Results showed that, as expected, under the thinking and nonreinforced information feedback conditions, internals increased their heart rates significantly

more than externals, but that with reinforcement externals performed significantly better than nonreinforced externals and achieved a level similar to that of internals. The external stimulus (metronome) condition yielded conflicting results and is not related to the present design. What is important about the Fotopoulos study is that it showed that externals can increase their heart rate as well as internals when provided with additional external reinforcement from the experimenter. It is noted that biofeedback involving the subjects evaluating their own performance was not enough to produce an increase in heart rate for externals, the intervention of an external source of reinforcement appeared to be the crucial variable. This finding seems similar to the previously cited work by Baron and Ganz (1972; Baron et al., 1974) where performance by externals was enhanced if feedback on accuracy of choices was provided by the experimenter, but not when the subject evaluated his own success. Internals, on the other hand, appear able to evaluate and respond to internal cues or biofeedback in controlling physiological functioning without additional external reinforcement. Viewing one's own proficiency appears to be sufficient reinforcement to maintain the behaviour for internals.

Ray (1971, 1974; Ray & Lamb, 1974) also examined heart rate conditioning as a function of locus of control. In support of Fotopoulos' (1970) findings, Ray found that

internals in both the feedback and no-feedback conditions were significantly better at increasing their heart rates than were externals. However, Ray also included a heart rate decrease condition. Under these instructions, externals exhibited a greater reduction in heart rate both with and without feedback. Self report measures gathered following the heart rate conditioning showed that internals and externals adopted different strategies in controlling their heart rates. During the deceleration task, externals spent significantly more time in "looking at objects in the room" than they did during acceleration, while internals engaged in this activity less than externals on both tasks. Libby, Lacey, and Lacey (1972) noted that cardiac activity was responsive to the type of task in which a person was involved. For tasks requiring close attention to the environment, a decrease in cardiac activity was noted while the opposite effect was produced by what they called "mental work". These findings fit conceptually with Ray's results, since externals, who would be expected to concentrate on their environment when presented with a task, were better at decreasing their heart rate, while internals, who tend to have a more cognitive orientation, were better at increasing their heart rate.

However, it does not appear that the differences in physiological control that Ray found are purely a function of cognitive style, since in the Fotopoulos (1970) study,

externals were able to increase their heart rate when reinforcement was provided by the experimenter. Whether or not this addition changed the focus of attention as predicted by Libby et al. (1972) is not known, but it is important for the present study that physiological responding seems to be influenced by manipulating environmental factors.

Blankstein and Egnor (1977) replicated the studies by Fotopoulos (1970) and Ray (1971, 1974) but provided larger intervals to learn heart rate control in both increase and decrease conditions. They theorized that, given adequate training time, internals would outperform externals at both heart rate increase and decrease. However, findings again showed that while internals were superior to externals at HR increase, there was no difference between these two groups on HR decrease, although an initial advantage at HR decrease by externals was erased over the longer trials.

Similarly, Gatchel (1974a, 1975b) and Schneider, Sobol, Herrmann, and Cousins (1978) found internals superior at HR increase, with unclear results regarding the HR decrease condition. Gatchel reports an initial advantage favoring externals which is lost over time, while Schneider et al. (1978) found no difference between internals and externals at HR decrease.

Overall, it would seem that HR increase and decrease involve different physiological mechanisms and possibly different cognitive strategies which seem to favour internals on the HR increase condition while showing inconsistent differences relative to locus of control on the decrease condition. However, only Fotopoulos (1970) altered the form of training to provide externally-oriented feedback which made it possible for externals to match the performance of internals even at HR increase.

EEG Control

Brolund and Schallow (1975) applied the theoretical reasoning of Fotopoulos (1970) and Ray (1971, 1974) to EEG alpha conditioning through biofeedback while providing better control groups and a separate reinforcement group. They postulated that, since internals tend to respond better to self reinforcement, biofeedback alone would be sufficient motivation to control alpha, while externals, who rely more upon environmental influences, would need additional extrinsic reinforcers which were provided through extra experimental credit or monetary rewards for successful alpha enhancement. Their results showed no differential response between internals and externals on either treatment condition. In fact, only the biofeedback plus reinforcement group showed significantly more alpha enhancement than either control group.

However, what Brolund and Schallow describe as extrinsic reinforcement would seem to raise motivational level rather than providing contingent reinforcement based upon alpha enhancement. While raising motivational level is an important means of enhancing any individual's performance, it does not provide the external locus of control individual with extrinsic feedback as to his performance, as do the Fotopoulos (1970), the Baron and Ganz (1972) and the Baron et al. (1974) studies.

Johnson and Meyer (1974) also examined EEG alpha conditioning as a function of locus of control. These authors found that internals were significantly better at controlling alpha with biofeedback than externals, while in a no feedback control group there were no differences between internals and externals. This study was also interesting in reporting a (nonsignificant) trend toward a changing of the locus of control orientation to a more external position in subjects who were not able to control alpha through feedback.

Similarly, Goesling, May, Lavond, Barnes and Carriera (1974), and Greer (1974) found internals more able to use EEG alpha wave feedback to increase their production of alpha waves, while Dolecki (1975) found no difference between internals and externals in alpha conditioning.

Control of Skin Temperature

Another area of physiological self control to be studied as it relates to locus of control is that of skin temperature training. Two doctoral dissertations (Roca, 1977; Tindell, 1978) have examined these relationships. Roca (1977) provided internals and externals with varying combinations of biofeedback and reinforcement (monetary rewards) and found essentially no difference between internals and externals on skin temperature control. If anything, externals seemed more able to benefit from temperature feedback than internals.

Tindell (1978) used just internals in her study, but found no difference in skin temperature control after biofeedback between "high" internals and "low" internals. She concluded that locus of control scores are not predictive of performance in skin temperature biofeedback training.

EMG Control

As in other areas of physiological self control, locus of control has had an inconsistent relationship to EMG biofeedback, with some studies favoring internals in muscle action potential reduction (i.e., Carlson, 1977; Gaston, 1977; Reinking, Mordret, & Tamazo, 1976), while others found no difference between internals and externals (i.e., Brown, 1977; Herzog, 1978; Modell, 1978; Stephenson, Cole & Spann, 1979).

In summary, a review of the biofeedback studies which tested the differential effectiveness of internals and externals at physiological self control showed inconsistent results. The only consistent results were that internals were more effective at heart rate increase with biofeedback. However, before discarding locus of control as a variable in demonstrating physiological self control, two issues need to be considered. One is that all of these studies used biofeedback in training subjects at self control. While biofeedback has demonstrated some success at allowing subjects to attain self control, it is not clear how this method can be viewed according to the locus of control construct. Since it could be considered as both an indication of what is occurring internally and as an external machine directing the training, biofeedback could possibly provide both internals and externals with the appropriate feedback. Other methods of physiological self control which more clearly differentiate internal control from control via external agents or machinery need to be tried to see if a different approach may demonstrate clearer differences between internals and externals.

A second point to be considered in evaluating the biofeedback studies is that no study, except that by Fotopoulos (1970) provided response-contingent feedback from someone other than the subject. As discussed previously, the condition most likely to facilitate performance by externals is

feedback provided by some external source. Further exploration is needed to examine the role of externally-directed feedback in self control training before any conclusions can be drawn about differential effectiveness of internals and externals.

In consideration of the first point mentioned above, Jordan (Note 4) studied the conditioning of skeletal functioning with biofeedback and progressive relaxation training, using EMG measures of the frontalis muscle.

Jordan's results were likely confounded by the administration of instructions for the different relaxation tasks before baseline was taken. Her control groups and internals in the progressive relaxation group showed significantly lower MAPs than the remaining treatment groups before any treatment had begun. It was difficult to evaluate subsequent treatment effects because of these differences, particularly for the biofeedback groups. Her results did show, however, that in the progressive relaxation condition, internals were significantly more effective in reducing their EMG levels than externals. A main effect for locus of control was found in the subjective ratings of relaxation, with comparisons showing that internals in the experimental groups reported significantly less tension, less anxiety, and more relaxation than externals. Indeed, Jordan states: "... it appears that the degree to which subjects feel

relaxed, tense, or anxious is as closely related to locus of control as to actual frontalis levels (p. 48)."

However, before this conclusion can be made, the results need to be replicated without the confounding influence mentioned above. In addition, as discussed previously, it appears that externals do not find proprioceptive feedback sufficient reinforcement to learn to control physiological functioning and need additional environmental reinforcement to do so, at least with regard to heart rate increase (Fotopoulos, 1970). Therefore, it would seem necessary to examine the effects of an external influence in providing feedback for externally controlled subjects undergoing progressive relaxation training before concluding they are not as effective as internals at relaxing. Also, it would seem important to see if the results of Fotopoulos generalize to skeletal function. These are among the goals of the present study.

In light of the studies by Baron and Ganz (1972; Baron et al., 1974) and Fotopoulos (1970), it was predicted that if provided with extrinsic feedback from someone else on the success of their attempts at relaxation, externals would be able to be as successful as internals in progressive relaxation training as measured by EMG. As a replication of Jordan's (Note 4) study while controlling for the confounding effects of instructions, progressive relaxation was expected

to yield more muscle tension reduction with internals than with externals, again, as measured by EMG. With respect to the self report measures of relaxation, it was expected that internals in both treatment groups would report less anxiety than externals, regardless of EMG readings of tension.

A qualification to the above conclusions is introduced by a line of research investigating the format of training according to locus of control orientation. Several authors (Abramowitz, Abramowitz, Roback, & Jackson, 1974; Friedman & Dies, 1974) found that therapies which were more directive or structured benefited external clients more, while internals found more benefit from nondirective therapies. Zimet (1979) in a review of locus of control and biofeedback, extends this thinking into the area of physiological self control. He reasoned that biofeedback would be more successful with externals if used with a more structured training format, while internals may benefit from a less structured form of biofeedback.

One study (Ollendick & Murphy, 1977) has investigated the role of locus of control in response to progressive relaxation and a less structured relaxation method called "cognitive relaxation" (after Bachman, 1968). They predicted that externals would become more relaxed with the structured progressive relaxation, while internals would do so with cognitive relaxation, and their results seem to support their predictions.

However, their results are based on comparisons between one experimental group and the control group, not with the other experimental group. That is, they reported a significant difference in relaxation achieved between externals in the progressive relaxation condition and externals in the control group, while there was no difference between this progressive relaxation group and externals in the cognitive relaxation group. For internals, the same problems exist, only the differences found only approached significance ($p < .10$). From these results it is not possible to conclude that structure works better for externals in relaxation training, while lack of structure does so for internals.

Another limitation in the Ollendick and Murphy (1977) study as it relates to the present study was that they did not compare internals with externals within the various treatment conditions. Therefore, it was not possible to assess how internals compared to externals in the progressive relaxation condition, which was one of the interests of the present study.

Finally, this study did not report sufficient statistical information to assess the results. It was not stated whether general interaction effects were found before specific comparisons were made, raising the likelihood that probability assumptions were violated. With these major criticisms, it is difficult to draw meaningful conclusions from this study.

While it may be an issue that format of presentation may have some effect on response according to locus of control orientation, the present study was interested in investigating the issue of whether there was any difference between internals and externals at one method of physiological self control, and whether responses to this method of self control could be altered using externally-directed feedback. While the literature in this area is inconsistent, the trend of the self control of physiological function studies with regard to locus of control would seem to favour the predictions made in the present study.

Pregnancy and Childbirth Complications

An increasingly important area of obstetrics concerns the psychological correlates of obstetrical disorders such as pre-eclamptic toxemia, habitual abortion, premature delivery, and excessive vomiting. Many studies have tried to delineate specific personality characteristics for each of these problems (see reviews by Fisher, 1973; Grimm, 1967; McDonald, 1968; and Sherman, 1971). While some studies report significantly different characteristics between women with normal pregnancies and women who develop one of the above problems, there have been few consistent results across studies and fewer replicated studies.

A more fruitful approach has been to investigate characteristics of women who develop one or more of several

obstetrical disorders on the assumption that individuals may respond differentially to similar psychological or situational stresses. The usual manner of conducting this research has been to administer a battery of tests to pregnant women before the onset of any complications, then examine the remainder of their pregnancies and their deliveries for any signs of disorder, and finally, see if any of the tests correlate with the disorders. Using this technique, Zemlick and Watson (1953) rated the emotional adjustment of pregnant women at their second and eighth months and six weeks postpartum using a battery of tests. Their major finding was a significant inverse relationship between anxiety and both prenatal adjustment and delivery adjustment. McDonald and his coworkers (McDonald & Christakos, 1963; McDonald & Gynther, 1965; McDonald, Gynther, & Christakos, 1963; and McDonald & Parham, 1964) and Davids and his coworkers (Davids & DeVault, 1962; Davids, DeVault, & Talmadge, 1961a, 1961b) had essentially similar findings, adding a list of personality characteristics of women who were to develop obstetrical disorders which generally indicated them to be more dependent and alienated than women without these disorders.

In general, therefore, it may be concluded that a woman's adverse reaction to her pregnancy may be related to some extent to the degree of anxiety present, to the amount of support she needs and receives, and to personality variables

such as dependency, immaturity, egocentricity, distrust, excessive conformity and conventionality, and defenses such as denial or rationalization.

Similar findings have been reported in the area of labour and delivery complications. Grimm (1961) studied the effect of self reported tension upon childbirth. While reporting generally negative results, she found that the second stage of labour was significantly longer for more tense multiparae women. She further investigated eleven subjects with extreme tension and found that they had significantly more deformed or stillborn babies.

Davids, DeVault, and Talmadge (1961) found that women who eventually had abnormal deliveries were significantly more anxious at the seventh month than women with normal deliveries. In a similar study, Erickson (1965) found no differences between a group of normal delivery primiparae and a delivery complication group, but did find significant differences between the two groups with multiparae women. Sherman (1971) hypothesized that psychological factors may be better predictors of childbirth complications or deliveries after the first childbirth, in which complications often occur due to physical causes such as fetal and pelvic size, malleability of the infant's head, and age of the mother.

While the number of studies in this area has been declining recently, perhaps because of the consistency of the

findings, Erickson (1976) has more recently studied the relationship between self-reported psychological variables and fifteen specific complications of pregnancy, labour and delivery. She found significant differences on self reported psychological factors between women who developed any of seven specific complications and a control group which had no such complications. Of interest in this study was that infant distress, rotating of infant's head and the requirement of forceps were all related to the mother's pre-delivery expressed fears, again raising the possibility that problems which were thought to be physical may have some psychological basis as well. Similar findings were reported in a more recent study by Crandon (1979).

Grimm (1967) concludes her review of this area by describing the role of psychological factors as minimal in predicting a mother's reaction to a physically normal childbirth, but crucial to predicting the reaction to a difficult labour. Women who are anxious, immature, dependent, and very passive are likely to react adversely to delivery problems, while more emotionally stable women will probably have adequate psychological reactions to even difficult childbirths. Chertok and his team of workers (1969), in a major study on preparation for childbirth, found that while they could not predict the amount of pain a woman would feel in childbirth, they could predict her reaction to it in terms of control, crying out, requests for medication, and facial expressions, by her personality makeup.

In summary, it is clear that psychological variables are related to not only reactions to pregnancy, labour, and delivery, but also to the development of obstetrical complications. Women who are anxious in particular are likely to have such problems as toxemia, labour disorders, use of forceps in delivery, and physically distressed babies.

Obstetrical Complications and Locus of Control

As has become obvious from research in childbirth and other psychosomatic areas, no single psychological variable will predict a physical complication, and no group of psychological measures will be consistently accurate in predicting the onset of a specific medical problem. However, this argument does not negate the search for additional variables which may be useful in adding data or tapping new areas to apply in future research. In considering pregnancy and childbirth complications, such an area would be the construct of internal-external locus of control. As discussed previously I-E measures have an extensive theoretical and experimental basis and have been applied to situations as diverse as predicting smoking behaviour and using birth control devices (Joe, 1971). Rarely in the literature, however, is the construct of internal-external locus of control considered as a variable related to pregnancy or childbirth. This paucity of research is surprising, since a number of variables concerning pregnancy and childbirth would seem to be related to the literature on locus of control.

It is generally agreed that the experience of childbirth is a stressful event. Hormonal changes occur more dramatically with childbirth than at any other time in a woman's life (Sherman, 1971). Concurrent with these physical changes are strong emotional feelings, particularly fear of death or injury to herself or her child (Grimm, 1967) as well as excitement and anticipation of the birth. While it is a matter of controversy whether or not childbirth is painful (e.g., Dick-Read, 1958; Velvoski, 1960), it is probable that most women experience at least discomfort and many feel unbearable pain during birth. Malcovati, Fornari, and Miraglia (1965) surveyed five thousand European women following childbirth and found that 10.5% reported no pain in labour, 77% reported mild to bearable pain, and 12.5% experienced unbearable pain.

Beecher (1959) discusses two components of the experience of pain: the original painful sensation and reactive pain. He considered the latter to be the major source of suffering experienced by the injured person. One component of reactive pain appears to be the control one has over the painful stimulus. Using rats, Mewrer and Viak (1948) compared shock-controlling and shock-noncontrolling groups and found that following shocks the two groups differed markedly on eating patterns. The authors concluded that an uncontrollable painful stimulus arouses apprehension that the pain could last indefinitely or get worse, leading to a fear from

a sense of helplessness. If the same stimulus occurred subject to the rats' control, little apprehension was aroused and the rats performed in what was described as a "nonchalant" manner.

A similar design was applied to human subjects by Phares (1962), in which subjects were instructed that they would be shocked on either a chance basis or contingent upon the accuracy of their responses (skill situation). A no shock control group was also included. Phares predicted that subjects under the skill condition would expect to have control over the shock and therefore behave in a way most likely to control the situation, which in this case was lowering their perceptual thresholds, while in the chance condition, subjects would not expect to have any influence upon shock administration, therefore they would not change their thresholds. Results supported these predictions, and comparisons between the shock control group and the no-shock group revealed no differences in performance, so that control over shock eliminated the normally debilitating effects of shock in this type of experiment. Lefcourt (1966) sees these studies as supporting the concept of instrumentality, or the contingency between acts and their effects, and suggests that nondisturbance from pain which is under control of the individual may be relevant to a wide range of responses.

Applying the above studies to labour and delivery, it would be predicted that internals would expect to be in control of their reactions to labour pain and therefore would become less disturbed by the painful stimuli during contractions. Externals, according to the above formulation, would view the pain as beyond their control, possibly becoming continually more severe or unending. Therefore, their reaction to uterine contractions would be more disturbed than internals.

However, a different possibility arises from research on response to threat and locus of control. This research, although it comes from few sources, suggests that internals and externals respond differently in coping with threat. Efran (Note 1) found that externals had a stronger tendency to remember failures than internals, which he interprets as an indication that externals can accept failure because they do not feel accountable for it, placing the blame instead on something external, while internals tend to avoid experiences of failure because they feel it is a reflection of their own ability in coping. Similar support comes from Lipp, Kolstoe, James, and Randall (1968) in a perceptual defense study, where it was found that physically disabled internals had higher recognition thresholds when shown pictures of disabled persons than did disabled externals, and from MacDonald and Hall (1969), who found that nondisabled internals rating the seriousness of various disorders rated

emotional disorders as more debilitating than did externals. Phares, Pichie, and Davis (1968) found that under threat externals recalled significantly more descriptions of their personality than did internals. And finally, Tudor (Note 8) correlated scores on the MMPI with the I-E Scale, and found that internals scored significantly higher than externals on the Denial Scale and the K Scale, indications which suggest that subjects were being defensive and denying negative information about themselves. In general, these studies suggest that internals are more denying than externals and tend to be more threatened by failure which implies a loss of personal control, than are externals (Joe, 1971).

In a more recent study, Houston (1972) manipulated stress by varying the amount of control subjects perceived they had over shock administration. Subjects received instructions for either uncontrollable shock administered randomly throughout the experimental task, or for controllable shock, which was to be administered contingent upon mistakes made during the task. He predicted, based on Lazarus's (1966) theory of stress, that externals would experience more anxiety than internals during shock conditions since they generally feel more helpless. In addition, he predicted that internals would perform better in the avoidable shock condition while externals would do so in the unavoidable shock condition, as predicted by previous work on the congruity of locus of control and task parameters (i.e., Rotter & Mulry,

1965; Watson & Bauml, 1967). While the latter prediction was supported, results showed that externals were significantly less anxious as measured by heart rate than internals in either shock condition, an effect opposite to what Houston and Lazarus predicted. Houston interpreted his results as indicating that, since externals see forces outside themselves as responsible for what happens to them, they do not become aroused when faced with external threat because they resign themselves to the situation, while internals do become highly aroused when faced with external threat. In support of the above studies on reaction to threat and locus of control, Houston (1972) also found that despite the differences in physiological arousal between internals and externals, there was no difference in self-reported anxiety, which he interpreted as indicating that internals are defensive about admitting anxiety.

These studies indicate that internals are more threatened by failure or loss of control than are externals, who don't feel responsible for what happens to them and expect not to be in control. During childbirth, it could be hypothesized that if labour was particularly difficult or if control were lost, internals would react much more adversely than externals.

In considering all the research on locus of control and reaction to stress, it was predicted that internals as a

group would have either more complications and discomfort during labour and delivery, or less discomfort and fewer complications, with externals experiencing less variability in their childbirths.

On factors related to pregnancy it is possible to predict more clearly a better reaction by internals. There is evidence that internals are less disturbed by novel situations than are externals (Rotter, 1966). Especially for primiparae women, pregnancy and delivery are unique situations which never been encountered before by that woman. Therefore, in the new experiences of pregnancy and delivery, internals would be expected to feel more comfortable.

Several studies show that externals are more distrustful of others than internals (e.g., Hamsher, Geller, & Rotter, 1968). One characteristic of pregnancy and childbirth which most writers agree upon is an increase in dependency upon others as the pregnancy progresses and particularly in labour. Fisher (1973) sees the increased dependency of the pregnant woman as inevitable, and cites it as a possible source of conflict between a pregnant woman and important others, particularly her husband. Preparation for childbirth texts (i.e., Dick-Bead, 1958) and obstetrical texts emphasize the importance of the relationship between a woman and her obstetrician, and research on reactions to childbirth shows that the presence of the husband in labour is

crucial to determining a woman's reaction to childbirth (Tanzier, Note 7). An external woman characterized by suspiciousness and mistrust would perhaps be reluctant to form the required relationships to aid in a good adjustment to pregnancy and labour.

A further demand of the pregnancy and childbirth experiences is a degree of self control: during pregnancy certain diets should be followed; exercise is recommended; excessive fatigue should be avoided; and relaxation should be practiced; while in childbirth, several forms of breathing must be applied; general relaxation should be achieved between contractions to allow rest and to maintain control; if possible specific muscles in the birth canal should be relaxed at the appropriate time (Oliver, 1972); and certain reflexes, such as bearing down close to transition and tensing during contractions, must be avoided. As with other characteristics of childbirth, this area has not been examined as it relates to locus of control. If the previous discussion on self control can be applied to complex situations such as pregnancy and childbirth, it would be expected that internals would be in better control of these functions than externals.

In his monograph on internal-external locus of control, Rotter (1966) theorized that internals would be more likely than externals to engage in behaviours which they perceived

as benefiting them or their situations, citing research by Seeman and Evans (1962), Seeman (1963) and Phares (1965), among others, to support this concept. More recently, Phares, Fitchie, and Davis (1968) showed that, despite recalling less negative information about themselves, internals were more willing to remedy their problems than externals. In studies with minority groups (i.e., Gore & Rotter, 1963; Strickland, 1965) it has been shown that internals are more likely to take an active role in improving their social condition. However, Gurin, Gurin, Lao, and Beattie (1969), Foward and Willaims (1970), and Lao (1970) showed that black students who blamed the existing social system rather than themselves for their race's disadvantages were more likely to take an active role in bettering their conditions. Gurin et al. (1969) discuss a factor of externality concerning control by systems rather than chance as realistic beliefs in some cases and therefore represent a conceptually different type of externality from that of personal control. In general, however, in situations concerned with personal control, internals are more likely to seek information and behave in a way which facilitates control over their environments (Joe, 1971).

Applying these findings to pregnancy and childbirth, it would be expected that internal women would seek more information about their condition, and would actively prepare themselves for dealing with childbirth so that, as Dick-Read

(1958) hypothesized, they would be less fearful and tense in childbirth because they would know what to expect. In the only study in the literature relating locus of control to childbirth, Oliver (1972) studied some of the above hypotheses. He surveyed 147 women either before or after childbirth, gathering information on their expectancies or recalled experiences toward a number of variables concerning childbirth. Measures he used included questionnaires on labour and delivery, demographic data, the California Psychological Inventory, and Rotter's I-E Scale. In addition, he included a distinction between the two primary factors, personal control and political-social control, or Rotter's scales as described by Mirels (1970).

Oliver's results regarding the I-E Scale and Mirel's two factors were essentially negative. All three scales were uncorrelated with the taking of Lamaze childbirthing training (Lamaze, 1950). A measure of active agency (i.e., personal control, mastery and coping during childbirth) was expected to be related to internality. However, although the results were in the predicted direction they did not reach significance on any of the three scales. However, Oliver concluded that Rotter's I-E Scale is not applicable to "... expected or experienced control in specific situations (p. 101)" and suggests that scales should be drawn up which apply more directly to childbirth expectancies.

As laudable as this suggestion is, Oliver's study suffers from several inadequacies which limit his dismissal of the I-E Scale. For example, much of his data concerning childbirth are based on the self reports of women who had yet to experience childbirth. There are data accumulating, as described above, that internals tend to deny negative information and react strongly to the threat of failure (i.e., Efran, Note 1; Lipp, Kolstoe, James, & Randall, 1968; Phares et al., 1968; and Tudor, 1970). By basing his results upon hypothesized reactions, Oliver has no idea about the accuracy of these statements.

A second weakness of Oliver's study, which he points out in his discussion, is that his hypothesis that internals would be more likely to take Lamaze (or other) training than externals neglects the fact that many women attend classes at the suggestion of their obstetricians, friends or relatives. Externals have been reported to be more influenced by others than are internals (Julian & Katz, 1968; Rotter, 1966), especially others who are perceived to be of high prestige (Richie & Phares, 1969). Simply measuring preparation versus nonpreparation neglects the source of influence for each woman toward attending the class. What was important in Oliver's study for the present research was that preparation classes showed a relatively equal number of internals and externals, so that in gathering subjects from these sources a fair distribution along the continuum of internality-externality may be expected.

In summary, the experiences of pregnancy and childbirth place certain demands upon the expectant women. In particular, a degree of self control, flexibility, an ability to cope with stress, and an increased dependence and trust in others are required. Obstetrical literature indicates that women who can remain calm, learn what to expect and what to do in order to prevent or deal with problems, and form close, supportive relationships, particularly with their husbands, will have generally better pregnancies with less discomfort and fewer complications. Literature on locus of control indicates that for most of the above demands, internals would be expected to react more positively than externals. Internals, as opposed to externals, tend to be less anxious (e.g., Butterfield, 1964; Feather, 1967; Ray and Katahn, 1968), more likely to be informed about issues they are concerned with and to apply this information more effectively (Phares, 1968; Phares et al., 1968; Seeman & Evans, 1962), and more trusting of others (Hamsher, Geller, & Rotter, 1968; Massari & Rosenblum, 1972). As discussed previously, internals are also likely to be more proficient at controlling their impulses, given the existing reinforcement parameters (e.g., Balch & Ross, 1975; James et al., 1965). While the present research predicts that deficient self control in externals can be overcome with extrinsic reinforcement in a laboratory setting, it is unlikely that externals will be provided with a sufficient degree of this type of feedback in the natural environment.

A number of predictions were made based on the above conclusions. On measures of emotional and physical adjustment to pregnancy, internal women would report more positive adjustments with fewer complications than externals. External women, because they tend to be less well informed and to seek external guidance when possible, would tend to use more medication during pregnancy and would seek or receive consultation with their physicians on more somatic complaints than internals. With disorders that have been found to show a psychosomatic component (e.g., spontaneous abortions, excessive vomiting, toxemia, and premature delivery), it was predicted that externals would be more likely to develop such disorders.

A long range goal of the present research was to provide a means of predicting a woman's emotional and physical adjustment to pregnancy and childbirth. While this phase of the research was exploratory, it was expected that measures of locus of control would provide some increased predictability over what is presently available. However, it is possible that an equally effective predictor of reaction to pregnancy and especially childbirth is a woman's response to the brief relaxation training to be used in the present research. That is, women who, regardless of locus of control orientation, can effectively reduce tension in a single, brief experimental session may in fact represent a group who can control their behaviour effectively during

childbirth as well. It was predicted that women who produce a high degree of tension reduction over the experimental session, as opposed to those who change very little, would report less discomfort, more experienced control, and fewer complications during childbirth.

In drawing together the various strands of this review into a series of hypotheses, an additional point needs to be made. The scale developed by Rotter (1966) to measure the construct of locus of control is seen by Rotter (1975) as a measure of a generalized expectancy of reinforcement patterns, applying in a general way to any novel situation in which the reinforcement parameters are unknown. While Rotter and others have extended the use of this scale into the area of self control, factor analytic studies by Reid and Ware (1973, 1974) question this assumption. These authors introduced a scale tapping specifically the area of self control and found it independent of the factor loadings found with the IE Scale. These findings are important for the present study. Since it may have been that differences between internals and externals in the present study would not be discriminated by the IE Scale since it did not tap self control, the Reid and Ware Self Control Scale was included in parallel hypotheses to examine contributions made by this scale. A more specific discussion of the IE and Self Control Scale characteristics will follow in the Method section.



Summary of Major Hypotheses

1. There would be an interaction between locus of control and treatment, in that externals would reduce the level of EMG tension more in the experimenter-cued feedback condition than externals in the progressive relaxation condition, while there would be less difference in tension levels between the two treatment conditions for internals.
2. As a replication of part of Jordan's (Note 4) study, internals on the I-E Scale would reduce frontalis tension more than externals in the progressive relaxation condition.
3. The same results as hypotheses 1 and 2 were predicted for internals and externals on Reid and Ware's Self Control Scale.
4. Both treatment conditions, progressive relaxation and experimenter-cued feedback, would yield more tension reduction over baselines than would the control condition.
5. On the self report measures of anxiety, internals would report a greater decrease in anxiety from pretest to posttreatment than externals, regardless of EMG levels. This prediction was made for both measures of locus of control and for the control group.

6. On measures of discomfort and complications during labour and delivery, internals as a group would show more extreme reactions than externals. That is, internals would tend to have either very positive or very negative childbirths, while externals would be more moderate in their experiences of discomfort and complications.
7. On measures of discomfort, complications, emotional adjustment, and physician contracts for symptoms during pregnancy, internals would report more positive pregnancies than externals.
8. Women who produce a high degree of tension reduction during the experimental session would report less discomfort, more experienced control, and fewer complications on measures of childbirth than women who show less tension reduction. Similar results were predicted for women who report a greater degree of anxiety reduction on the self report measures.

METHOD

Subjects

Subjects were 95 primiparae Caucasian pregnant women who were volunteers contacted through various childbirth preparation classes offered at three local hospitals and through city public health offices. The procedure for volunteering was as follows: Through the cooperation of the directors of the childbirth preparation classes, names and phone numbers of all registrants in the classes were obtained and contacted. The author contacted each woman registered by phone, told her that he was conducting a study on women registered for prenatal classes and asked if she would be willing to receive a letter describing the research and a questionnaire. Only a few women refused at this stage, and approximately 170 letters and questionnaires were sent out (see Appendix A) over a 15 month period.

Approximately 110 women returned adequately completed questionnaires, but fifteen were unwilling to participate in the subsequent stages of the experiment, yielding the 95 women used in the study.

Demographic information gathered on the 95 showed them to have an average age of 25.6 years (S.D. of 3.29), an average

education of some university for both herself and her husband, and an average income near \$15,000. Ss were approximately seven months pregnant with their first child when they participated in the study. Ss were contacted and they participated in the the experimental procedures before their first prenatal class. A graphic representation showing the distribution of subjects among the various demographic categories is included in Appendix C.

In the prenatal questionnaire, Ss filled out Rotter's (1966) I-E Scale and Reid and Ware's Self Control Scale (1974). The Rotter I-E Scale is a 23 item forced choice scale with six fillers which provides scores on a continuum of internality-externality within the control construct. This scale has been subject to a great deal of criticism since its inception, so a review of these criticisms and the rationale for using it in the present study will be presented below.

Rotter (1966) hypothesized that his I-E Scale measured a single dimension upon the locus of control construct. He offered support for its unidimensionality with factor analytic studies which showed a single factor accounting for the majority of the variance with additional factors accounting for very little variance (Franklin, 1963; Rotter, 1966). However, more recent factor analyses have shown that the I-E Scale is more multidimensional in character.

In a major study on locus of control, Gurin and her coworkers (Gurin, Gurin, Lao, & Beattie, 1969) factor analysed items from Rotter's I-E Scale along with additional items aimed at tapping beliefs about personal impact in race relations. The scales were administered to blacks at several colleges in the U.S. and the data collected were factor analysed, yielding four factors: 1. Control Ideology, which refers to a person's general belief about the extent to which most people in society have control; 2. Personal Control, or the extent to which the subject believes in his own control over events in his life; 3. System Modifiability, referring to the extent to which the person feels control over more global events such as war, political events, or racial discrimination; and 4. Race Ideology, relating specifically to race related items. While it could be that the factors reported are specific to blacks, other factor analyses report agreement with Gurin et al.'s (1969) finding, at least with respect to the two major factors of Personal Control and Control Ideology (e.g., Lao, 1970; MacDonald & Tseng, Note 5; Minton, Note 6; Guttenberg, Note 3; and Reid & Ware, 1973, 1974). These findings do not appear to be limited to Rotter's I-E Scale, as MacDonald and Tseng (Note 5) reported similar multidimensionality in the scale by James.

The criticism levelled at locus of control scales, then, is that they are not measuring a single variable but rather

at least two different variables. Subjects selected on the basis of this scale may not be assumed to be similar in terms of internality or externality; an individual may be internal on the Personal Control dimension but not on the Control Ideology dimension, for example.

Rotter (1975) attacked these criticisms and defended his scale as applicable for measuring generalized locus of control:

A broad concept of internal versus external control is viable if in most samples of subjects a better-than-chance relationship can be seen between attitudes of subjects toward fate, luck, and control of powerful others, or the belief that one can control distant political events as well as personal ones. In each case the subclasses may show interrelationships among referents that are significantly higher than those between referents for one subclass and those of another subclass (p. 63).

To dismiss the construct, Rotter argued, because subclasses exist which correlate with different items misses the intention of a measure of a generalized nature and neglects that the subclasses are nevertheless correlated on these generalized concerns. Rotter (1975) accepts and encourages the development of subscales, but cautions that these be used for prediction of specific behaviours, and only then if the subscale produces "... a significantly higher relationship than that of the score of the total test (p. 63)." However, with the bulk of the evidence clearly indicating the presence of two primary factors with the I-E Scale, research using this scale must at least consider these dimensions,

and if possible consider the applicability of other scales to the purpose being studied.

Rotter's scale has also been criticized for correlating too highly with social desirability measures such as the Marlowe-Crowne Social Desirability Scale or Edward's Social Desirability Scale. For example, Feather (1967) found a significant correlation between the I-E Scale and the Marlowe-Crowne Scale ($r=.42, p .01$), as did Altrocchi, Palmer, Hellmann, and Davis (1968) and Hjelle (1971). Bezins, Foss and Cohen (1970) and Cone (1971) found similar significant relationships between the I-E Scale and the Edward Scale. However these findings are not consistent. Rotter (1966), in the development of the scale, reported correlations between the I-E Scale and the Marlowe-Crowne Scale ranging between $-.07$ and $-.35$ and cited a wide range of studies with fairly low correlations as further supporting data. Additional studies by Strickland (1965), Tolor (1967), and Tolor and Jalowiec (1968) all reported nonsignificant correlations between the I-E Scale and the Marlowe-Crowne Scale.

Finally, Rotter's scale has been criticized for its forced choice format, which is said to be difficult to use for some people and seems to encourage a bias toward social desirability (MacDonald, 1973). However, this issue seems to be a matter of personal preference, with no clear support offered for either forced or nonforced choice formats (Joe, 1971; MacDonald & Tseng, 1971).

The problem remains of which measure of locus of control should be used, and the choices are rapidly expanding. Gurin et al. (1969), as mentioned above, have developed a scale based upon Rotter's I-E Scale with additional items tapping beliefs on personal efficacy and personal and external forces in race relations, which MacDonald (1973) sees as the best multidimensional measure available, but it seems more suited to social-political control than personal control beliefs.

Levenson (1972) questioned a single scale combining expectancies of fate, chance, and powerful others. She developed three scales to measure these expectancies: the "I" Scale, which measured the extent to which a person feels control over his or her life; the "P" Scale, which involved the person's belief in powerful others; and the "C" Scale, which measured the expectancy of being controlled by chance happenings. Each scale consisted of eight items in a Likert format, with several items in each scale adapted from Rotter's I-E Scale. Initial results with these scales have been encouraging, particularly with regard to low correlations with social desirability scales (MacDonald, 1973).

Several authors have used or suggested using the two factors found by authors such as Mirels (1970) on the I-E Scale as separate subscales of a unidimensional nature (Oliver, 1972; Reid & Ware, 1973). However, these subscales are

rather short, and little has been done in examining reliability and validity characteristics. Reid and Ware (1974) have developed an extension of the I-E Scale constructed to tap the area of self control, which other locus of control scales do not explicitly tap. These authors factor analysed data from Rotter's scale combined with their subscale of Self Control, and found that the Self Control factor was indeed separate from the two major factors commonly found on the I-E Scale. However, little additional research has been carried out on the Reid and Ware subscale.

Since the present research dealt with the concept of self control, it was thought that Reid and Ware's Self Control Scale would be applicable in this situation. However, as the present study was based upon research using Rotter's I-E Scale, and since there is too little data on the Reid and Ware Scale to justify its exclusive use, both the I-E Scale and Self Control Scale were used as selective instruments, with separate analyses carried out to allow for examination of contributions made by each scale.

Subjects were assigned internal or external status on both Rotter's I-E Scale and Reid and Ware's Self Control Scale by a median split performed on the scores from each scale. In addition, subjects were randomly assigned to one of four experimental conditions - Progressive Relaxation, Experimenter-Cued Feedback, Control Group I, and Control

Group II, prior to their locus of control status being determined.

Of the two control groups, Control Group I was included to test the efficiency of the experimental relaxation procedure. This group, as described below, participated in the experimental sessions but only received directions to sit in silence rather than actively following a relaxation procedure. Control Group II was included to account for any effect the experimental session may have on subjects' labours and deliveries. These women did not participate in the experimental session but simply filled out the prenatal and postpartum questionnaires.

The distribution of Ss into the four experimental categories is presented in Table 1, along with average scores on the I-E Scale and Self Control Scale. As a test of

 Insert Table 1 about here

randomization procedure a 1 X 4 MANOVA with 4 dependent measures was run, comparing the four groups on the four demographic measures of age, education of S, education of husband, and income. No significant differences among the groups on the 4 measures considered ($F \leq .67$, $p = .73$ for overall group effect).

Table 1
 IE Scale and Self Control Scale
 Distribution of Scores

		Group			
		PR	ECF	CONTROL 1	CONTROL 2
Internal	IE	6.67 n=15	6.5 n=10	6.17 n=12	7.36 n=14
	SC	3.07 n=14	2.83 n=12	2.54 n=11	2.75 n=8
External	IE	13.17 n=12	14.12 n=12	15.0 n=14	12.5 n=6
	SC	6.15 n=13	6.7 n=10	6.4 n=15	6.18 n=11

Overall IE $\bar{x} = 10.09$

SD = 4.31

SC $\bar{x} = 4.72$

SD = 2.07

Instruments and Apparatus

In addition to the locus of control measures described above, the following measures were used: Spielberger's State-Trait Anxiety Inventory (STAI); a demographic information questionnaire and history of pregnancy; and a postpartum questionnaire.

The STAI consists of two 20 item scales designed to measure 1) transient anxiety states (A-State) and 2) a more general tendency to become anxious (A-Trait) which is more stable over time and across situations. The A-State Scale has been shown to reflect decreases in anxiety following brief progressive relaxation (i.e., Edelman, 1970; Spielberger, Gorsuch, & Lushene, 1970) and correlates well with physiological measures of anxiety (Johnson & Spielberger, 1968). Spielberger and Gorsuch (1966) also recommend using it in situations requiring multiple administrations. Therefore, this scale seems particularly well suited for the present study. The A-Trait Scale was given mainly as exploratory research, as no one has used this scale in connection with pregnancy or delivery variables.

The prenatal questionnaire (see Appendix A) included questions such as age, education, and economic status in the demographic section, and some rating of ease or difficulty of pregnancy to that point with a check list of specific complications for the pregnancy section.

Postpartum measures taken are described below.

Two adjacent rooms were used in the experiment. Subjects sat in a comfortable chair in a temperature controlled (24 degrees C., cf. Goldstein, 1972), soundproof, shielded room. All instructions were played through a speaker, and experimenter-cued feedback was provided by a tone generator. Progressive relaxation instructions similar to Paul's (1966) version of abbreviated progressive relaxation were tape recorded and presented to subjects in the two treatment conditions via the speaker. The progressive relaxation instruction was a recording of E, who at that point had had over 200 hours of relaxation training experience in a supervised clinical setting.

EMG leads were fed into the second room where they were attached to a BFT 401 Feedback Myograph, the output of which was fed through a BFT 231 optical isolator to a Hewlett-Packard instrumentation recorder 2960. A digital step counter was fed into a channel on the tape recorder to provide a coding system for each time interval to be integrated.

Spielberger, in his review of the literature on anxiety (1972), states:

clinical and research literature on transitory anxiety suggests that the presence of anxiety states in humans can be most meaningfully and unambiguously defined in terms of some combination of introspective verbal reports and physiological-behavioural signs (p. 29).

Applying this suggestion to the present research, the A-State Scale data was gathered in addition to EMG data, as described above.

The frontalis muscle was chosen as an indicator of muscle tension because several studies have shown it to be a reliable measure. Voas (Note 9) studied the test-retest reliability of EMG measures on several muscles over a variety of conditions. While other muscles yielded relatively low reliabilities, the frontalis EMG's reached coefficients as high as .95. Martin (1956, 1958) found similar high correlations between two test periods ($r=.81$), which Goldstein (1972) sees as a major reason for using the frontalis muscle in measuring individual differences.

In a study directly related to the present research, Matthew and Gelder (1969) found a significant decrease in frontalis muscle tension following brief progressive relaxation. While other muscles have shown similar responsivity to progressive relaxation (e.g., Paul, 1969), the reliability of the frontalis is a strong indicator for its use in the proposed research.

The frontalis has also been shown to be related to personality differences in the study of tension. Shipman (1970) related EMG measures of tension in seven muscles to personality measures. While six other muscles were not related to personality variables beyond a chance level, a striking association was found between the frontalis muscle and a continuum of depression-high ego strength.

Procedure

I. Relaxation Training

The procedure followed was similar to that used by Paul (1969) and Jordan (Note 4). At the start of the experiment, subjects had electrodes attached to their foreheads (according to Pauls, 1969) with their purpose being explained and assurances given that no shocks nor anything harmful would occur.

Before the attachment of EMG electrodes, subjects were asked to fill out the A-State Scale. Upon completing this scale electrodes were attached with a brief description of their function. Then the following statement was given:

Before beginning the experiment, I have to adjust the equipment and make sure it is operating correctly. Just sit quietly, moving as little as possible, until I have completed the check. When I am ready, I will let you know over the speakers and further instructions will be given then.

The Experimenter then left the room and a 5-minute adaptation period followed, the last minute of which served as a baseline period for EMG level.

After this time, each group received tape recorded instructions on what to do next. Recorded instructions were used to control for possible bias during the study and were given at this time rather than prior to the baseline period to control for possible confounding effects found by Jordan (Note 4) Experimenter was not aware of the locus of control of the subjects or the treatment condition they would be

receiving until his contact with the subject was over and the subject was alone in the experimental room. The following instructions were given:

a. Progressive Relaxation Group (PR)

This is a study on relaxation, which is an important part of preparing for childbirth. The method to be used in this experiment is followed by the majority of childbirth training classes as an effective means to relaxation. Basically, the procedure hinges on the fact that complete relaxation is the absence of tension. If you are completely relaxed, it is physiologically impossible to become tense. The way in which we'll do this is to have you systematically focus your attention on the various muscle groups throughout your body, first tensing each group for a few seconds --holding them long enough for you to identify exactly where you feel tension, and what it feels like. Then, when I say "relax", I want you to immediately let go--to stop tensing--and merely focus your attention on what those muscles feel like as relaxation takes place. By first tensing your muscles, the level of tension increases over your current level, such that when you release the muscles, the level of tension drops below the point where you started. Each time you tense and release a muscle, the resulting level of tension becomes lower and lower, to the point where no tension is present at all. By focusing your attention on this process as it takes place, with practice, you can eventually reach the point where just thinking or recalling the experience of release is enough to bring about relaxation itself. It is important that you focus your attention only on the specific muscle group we're working with at that time.

Now, just listen to the recorded instructions and follow what is said. (Much of these instructions come directly from Paul, 1969, p. 427.)

An adaptation of Paul's (1966) brief progressive relaxation was then played, where the subject was instructed to tense and hold a particular muscle, then to release the tension

when instructed to relax, with instructions to focus upon the contrast between tension and relaxation and with indirect suggestions to relax. This procedure took about 30 minutes.

b. Progressive Relaxation with Experimenter-Cued Feedback (ECF)

Instructions were identical to the PR group but were followed with:

Some people have problems with this procedure because they can't recognize when they are becoming relaxed. Therefore, to help you distinguish how you are doing, I will sound a tone, like this --- to indicate that you are becoming more relaxed, as shown by the electrodes on your head. I will sound the tone whenever you show a significant decrease in tension over a one-minute period.

The same tape was played as in the PR condition. However, feedback in the form of a tone was provided by the experimenter contingent upon a predetermined decrease in the level of muscle action potentials. This form of feedback is similar to that used by Fotopoulos (1970) in her heart rate conditioning study.

c. Control group

This is a study on relaxation, which is an important part of childbirth preparation. What I want you to do is to sit quietly and make yourself as relaxed as possible while I measure your physiological responses. Do not go to sleep or move around, just concentrate on making yourself relaxed. I'm especially interested in the different rates at which people become relaxed physiologically, as well as the way in which different

people make themselves relaxed. When the time is up, further instructions will be given over the speakers. Now, close your eyes and try to relax.

A time period equal to the progressive relaxation tape then followed in which the subject sat in silence.

Posttreatment

The end of the progressive relaxation tape instructed subjects to sit quietly, enjoying their relaxed state for a few minutes, following which was a five-minute period of silence. The last minute of this period was considered as the posttreatment period and EMG recordings were made of these data. For control subjects, the last minute of their resting period was the posttreatment period. Following this interval, termination instructions similar to Paul (1969, p. 428) were given and subjects were immediately asked to fill out the A-State Scale.

Postpartum Measures

After the subjects' childbirths, the following data were gathered:

A questionnaire (see Appendix B), given to subjects after relaxation training, was filled out postpartum and mailed to E. This method was used by Klusman (1975) with a 100% return rate, and is also used by some prenatal classes with a return rate of about 75%. Subjects having delivered by Caesarean sections were not included in this section. This questionnaire tapped areas of the following:

1. Information about pregnancy, especially the last trimester, including weight gain, amount of discomfort experienced, and a check list of complications.

2. Birth data, such as date of delivery and whether this was full term, child's birth weight and birth defects.
3. Labour and delivery information, including ratings of pain experienced in labour and delivery, medication, length of labour (over all stages), whether or not an episiotomy was performed, and a check list of complications.
4. Postpartum information, such as depression, breast feeding, and family problems.
5. The A-State and A-Trait Scales were administered postpartum to see if any changes occurred in level of anxiety.

To arrive at measures of emotional and physical reaction to pregnancy, labour, and delivery, scores on items of the prenatal and postpartum questionnaires relating specifically to these three areas were summed. The items providing an adjustment to pregnancy score were questions 4, 5, and 7 from part II in the Prenatal Questionnaire, and items 1-7 on the Postpartum Questionnaire. To compile the labour score, items used were questions 1, 2, and 4 from Section III of the Postpartum Questionnaire, plus each item on the Adjustment to Labour Scale, devised from Oliver (1972). Finally, the items used to devise the delivery score were questions 2, 5, and 6 from the Delivery section of the Postpartum Questionnaire, plus each item on the Adjustment to Delivery Score, again from Oliver (1972).

RESULTS

The experimental procedure yielded the following data for each subject: I-E Scale, Self Control Scale, Prenatal Questionnaire, A-State and A-Trait Scales (both pre- and post-natal), EMG recordings of the experimental relaxation sessions, A-State Scale for pre- and post-experimental sessions and the post-natal questionnaire. The first five major hypotheses are involved with the experimental relaxation sessions, so those analyses will be discussed first.

The EMG analog data was digitized at the University of Manitoba Faculty of Medicine Computer Department, where each 30 second interval to be considered in the analysis was sampled 400 times/second, the area within each of those samples representing the amplitude of Muscle Action Potentials for that time period. The program summed and integrated these samples, yielding a measure of the total amount of electrical activity for each 30 second sample (in millivolts). This output was then considered for the measurement periods to be examined: baseline (2x30 second intervals), and the posttreatment measures (2x30 second intervals). Pre- and post-measures on the A-State Scale were also used to test the response to the experimental procedure.

To test the randomization procedure and to assess the equivalence of groups, 2 X 2 X 2 ANOVAs were run on EMG and A-State pre-scores, factors being I-E, Self Control Scale, and groups. No significant differences were found in these analyses (p's all > .10) so the main data analyses were run.

Relaxation Procedure

As a test of the effectiveness of either relaxation procedure, Hypothesis 4 predicted that both PR and ECF conditions would yield greater tension reduction over baseline than would the control group for both EMG and A-State measures. In addition, post hoc comparisons of the control group using IE and SC measures were included to see if locus of control had any effect.

Therefore, a 3 X 2 X 2 ANOVA with one repeated measure (EMG pre and post) was run, with 3 groups of PR, ECF, and Control, Internal or External on IE, and Internal or External on SC as the between factors.

Results of the above analysis for EMG, show no significant main effect for groups over trials ($F=.94$). To compare the change over trials of the two experimental groups (PR and ECF) with the control group, a t test for unequal N's was run (see Kirk, 1968, p. 277) comparing the sum of PR and ECF with 2 X control group. The obtained t for this comparison was -1.22, which is less than the critical value

required for significance at the .05 level of 1.67 for $df=60$.

In the post hoc analysis examining the effect of IE and SC the control group, no significant effects were found for either the IE dimension ($F=.80, p \geq .37$) or SC ($F=2.05, p \geq .15, df=1, 63$).

A similar t test for unequal N 's was run on the A-State data comparing the combined PR and ECF groups with the control group. This analysis yielded a $t=1.80$, which is significant $p < .05$ in the predicted direction. In the post hoc comparisons to examine the effects of either locus of control measure on the control condition, t values of .05 for the I-E comparison on the IE Scale, and 1.60 on the SC Scale was obtained, both non-significant. The value obtained on the SC Scale approaches significance $p < .10$ with externals reporting a greater decrease in anxiety.

EMG Results

The first three hypotheses were tested using the EMG data in a $2 \times 2 \times 2$ ANOVA with one repeated measure. Factors in this ANOVA were Internal-External on the I-E Scale, Internal-External on the Self Control Scale (SC), and experimental conditions; Progressive Relaxation (PR) or Experimenter-Cued Feedback (EDF). IE Scale and SC Scale measures

were included in the same analysis to allow for examination of possible interaction effects between the two scales. The control group was not included in this analysis because these hypotheses only dealt with comparisons between internals and externals in the two experimental procedures.

Results of this analysis are summarized in Table 2.

Insert Table 2 about here

As can be seen from Table 2, a significant trials effect was found ($F=33.98$, $p<.0001$). Multiple t tests were run on each condition (PR and ECF) and on internals and externals from IE and SC Scales using the Bonferroni t test, and all conditions and IE measures showed significant changes over time except for internals on the IE scale ($t=2.72$, critical value= 2.89). These results are presented in Table 3.

Insert Table 3 about here

Hypothesis I predicted that there would be an interaction between locus of control and treatment, with externals reducing tension more in the ECF condition than in the PR condition, while internals would show less difference between the two treatment conditions.

The obtained means are shown in Figure 1. The predicted

Table 2
Analysis of Variance of EMG Data

	<u>DF</u>	<u>MS</u>	<u>F</u>
Group	1	921284.58	.05
IE Scale	1	12463899.05	.72
SC Scale	1	565922.75	.03
Group x IE	1	13875076.97	.03
Group x SC	1	47909210.87	.80
IE x SC	1	645053.15	.79
Group x IE x SC	1	808347.09	4.14*
Error	41	338680.24	
Trials	1	86619126.44	33.98**
Trials x Group	1	5527472.03	2.17
Trials x IE	1	12744989.47	5.00*
Trials x SC	1	4216223.51	3.00
Trials x Group x IE	1	841870.15	.33
Trials x Group x SC	1	1907715.85	.75
Trials x IE x SC	1	8949.83	.00
Trials x Group x IE x SC	1	9920492.90	3.90*
Error	41	2549240.98	

* $p < .05$
 ** $p < .001$

Table 3
 Multiple Comparisons of Trials
 Main Effect on EMG

<u>Group</u>	<u>t</u>	<u>Significance</u>
PRE-post (all Ss)	6.14	$p < .01$
Progressive Relaxation	5.49	$p < .01$
Experimenter-Cued Feedback	3.08	$p < .05$
Internals (IE Scale)	2.72	N.S.
Externals (IE Scale)	5.99	$p < .01$
Internals (SC Scale)	3.37	$p < .05$
Externals (SC Scale)	5.34	$p < .01$
Control	4.43	$p < .01$

Insert Figure 1 about here

interaction was tested by the Repeated Group X IE interaction. As shown on Table 2, this interaction was non-significant ($F < 1$).

As a more precise test of Hypothesis 1, an a priori t test on the difference between PR-ECR for Internals on the IE Scales compared to PR-ECF for Externals was run. This test produced a $t = .758$, which was also not significant.

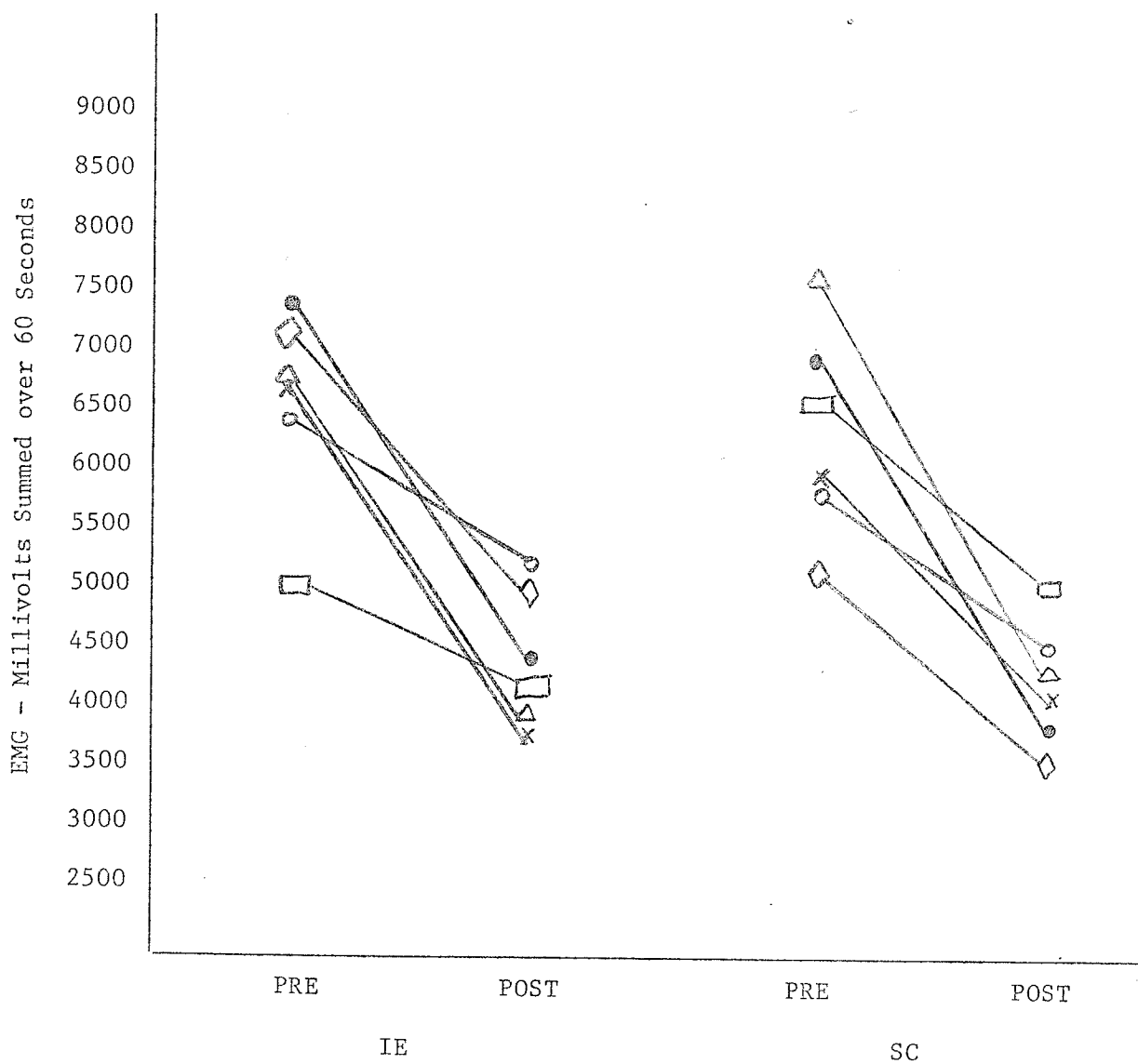
Concerned specifically with the PR condition, Hypothesis 2 predicted that internals would show greater tension reduction in that condition than would externals. The general test of this hypothesis was again the interaction between group and IE, repeated, as shown in Table 2.

To test Hypothesis 2 more precisely from the above ANOVA, a planned comparison for simple effects was run examining just the progressive relaxation condition as it related to IE (see Figure 1, PR condition). These differences were non-significant ($F < 1$).

Similar results to Hypotheses 1 and 2 were predicted in Hypothesis 3 for the Self Control Scale. This hypothesis was tested by the interaction between Group and SC, repeated, on the main ANOVA. As shown on Table 2, this interaction yielded an $F = .75$, which was not significant.

Figure 1

EMG Means Pre- and Post-Experimentally



- ◇ - PR - Internals
- - ECF - Internals
- △ - PR - Externals
- - ECF - Externals
- × - Controls - Internals
- - Controls - Externals

Again, planned comparisons were carried out to examine the difference between PR-ECF for Internals on the Self Control Scale vs. the same difference for Externals. A t test on this comparison showed a $t=1.13$ ($p>.05$, n.s.).

A planned comparison for simple effects was carried out on the PR condition, as in hypothesis 2, to examine Internals vs. Externals from the Self Control Scale in just the PR condition. This analysis was non-significant ($F<1$).

Hypothesis 5 was concerned with the A-State self report measure of anxiety. It predicted that internals would report a greater decrease in anxiety from pre- to post-treatment measures than externals. Mean scores on A-State pre- and post-experimentally for each group and each locus of control category are presented in Table 4.

Insert Table 4 about here

This hypothesis was tested both between just the two experimental groups, PR and ECF, and between all three groups including the control group. Therefore, two ANOVAs were run, one a $2 \times 2 \times 2$ with A-State as repeated measure, and the other a $2 \times 2 \times 3$. Means for the three groups and for both measures of locus of control on the A-State are shown in Figure 2.

Table 4
 Mean A-State Scores Pre- and
 Post-Experimentally

<u>Group</u>	IE Internals		SC Internals		IE Externals		SC Externals	
	<u>Pre-</u>	<u>Post</u>	<u>Pre-</u>	<u>Post</u>	<u>Pre-</u>	<u>Post</u>	<u>Pre-</u>	<u>Post</u>
PR	33.3	26.3	33.6	26.3	38.2	27.1	37.6	27.1
ECF	33.9	24.6	32.5	24.2	30.9	24.7	32.0	22.8
Control	35.3	28.5	35.0	30.1	33.0	26.2	33.4	25.2

Insert Figure 2 about here

A significant trials effect was found on the A-State measures ($F=154$, $p<.001$). Again, multiple t tests were run using the Bonferroni procedure to examine which conditions contributed to this effect with results being presented in Table 5.

Insert Table 5 about here

All groups and locus of control orientations reported significant decreases in anxiety over the experimental procedure. Tests examining the difference between Internals and Externals yielded an $F=.04$ for the IE Scale, and $F=.41$ for the SC Scale, both nonsignificant.

Questionnaire Results

Of the 95 women who completed the first phase of the study either as participants in the experimental procedure or as members of Control Group II, 90 returned completed postpartum questionnaires, a return rate of almost 95%. Those who did not respond were contacted by mail and had either moved ($N=3$) or simply did not reply ($N=2$).

Figure 2

A-State Means Pre- and Post-Experimentally

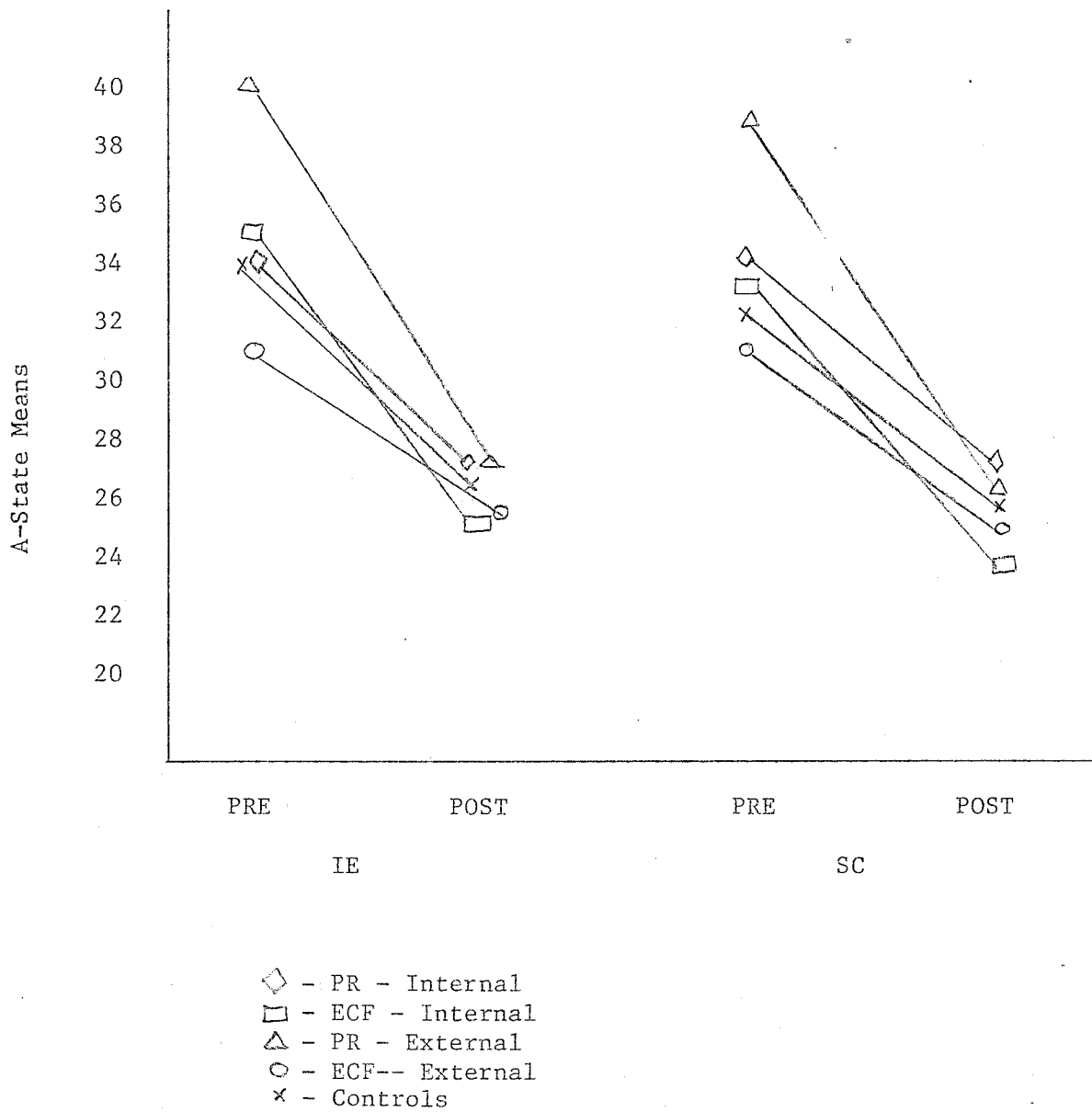


Table 5
 Multiple Comparison of Trials Main
 Effect on A-State

<u>Group</u>		<u>T</u>	<u>Probability</u>
Total			
Pre-post		5.76	p < .01
PR		4.54	p < .01
ECF		3.55	p < .01
Internals	IE	3.92	p < .01
Externals	IE	2.93	p < .05
Internals	SC	3.82	p < .01
Externals	SC	4.31	p < .01
Controls		3.12	p < .05

Of these 90 women, 14 had delivered through Caesarean section, so were not included in the labour or delivery analyses. In examining the records of women who had Caesareans it does not appear that requiring a Caesarean section is related to locus of control scores, because of the 14 who had Caesareans, 7 were internals and 7 externals on Rotter's I-E Scale, and an even split was found between internals and externals on the Self Control Scale as well.

To test Hypothesis 6, which predicts internals showing more extreme reactions to labour and delivery than externals, and Hypothesis 7, which predicts internals will report more positive pregnancies than externals, the two questionnaires were used.

As described above, items from both the Prenatal and Postpartum Questionnaire relating to emotional and physical reactions to pregnancy were summed, providing an adjustment to pregnancy score. Items included were questions 4, 5 and 7 from part II in the Prenatal Questionnaire, and items 1-7 on the Postpartum Questionnaire. Likewise, items from the Postpartum Questionnaire which related specifically to emotional and physical reactions to labour and to delivery were summed, yielding an adjustment to labour score and an adjustment to delivery score for each subject. Questions from the Postpartum Questionnaire used to compile the labour score were questions 1, 2, 4, and 5 from section III, plus each item on the Adjustment to Labour Scale.

The same procedure was used for the Delivery Score. Questions 2, 5, 6 and each item on the Adjustment to Delivery Scale were summed (see Appendices B and C for these questionnaires).

To evaluate the internal consistency of these scales, reliability coefficients were calculated using Cronbach's alpha procedure. Coefficients obtained were as follows: Pregnancy, .69; Labor, .81; Delivery, .72. These reliability measures were considered sufficient indication of internal consistency so no item analyses were carried out.

As Hypothesis 6 predicted internals to have more extreme, that is, more positive or more negative, labours and deliveries, scores of reaction to labour and to delivery were standardized into absolute Z scores and summed for each subject, providing an indication of deviation from the mean for each subject.

The three measures, pregnancy adjustment, labour absolute Z score and delivery absolute Z score, were considered as dependent measures in a 2 X 2 Multivariate Analysis of Variance, using the SAS computer program (1979). The independent variables used were the two measures of locus of control, IE and Self Control.

In addition, to test if locus of control was related in an unpredicted way to labour and delivery, a 2 X 2 Multivar-

iate Analysis of Variance with 3 dependent measures was run, similar to the previous analysis, but using raw scores for labour and delivery instead of absolute Z scores.

These analyses yielded the results shown below. For the Pregnancy ratings, no difference was found between Internals and Externals on the IE Scale $F=.06, p>.80$ (df 1,73). However, a significant difference was found between Internals and Externals on the SC Scale $F=6.27, p>.01$ (df 1,73). Figure 3 illustrates these findings graphically,

 Insert Figure 3 about here

The standardized absolute Z scores on Labour and Delivery measures yielded non-significant results with all F values being less than 1. As Figure 3 shows, the summed average absolute Z scores for respective levels of locus of control were almost equal.

When analysed using the raw scores of Labour and Delivery ratings, more variable results are found (see Figure 3).

On Labour scores, a larger but still non-significant F was found ($F=1.85, p>.17, df 1,73$) favouring Internals on the SC Scale vs. Externals.

And on the Delivery scores, non-significant F values were found for both IE and SC, but a significant interaction was found between IE and SC ($F=3.75, p<.05, df=1,71$).

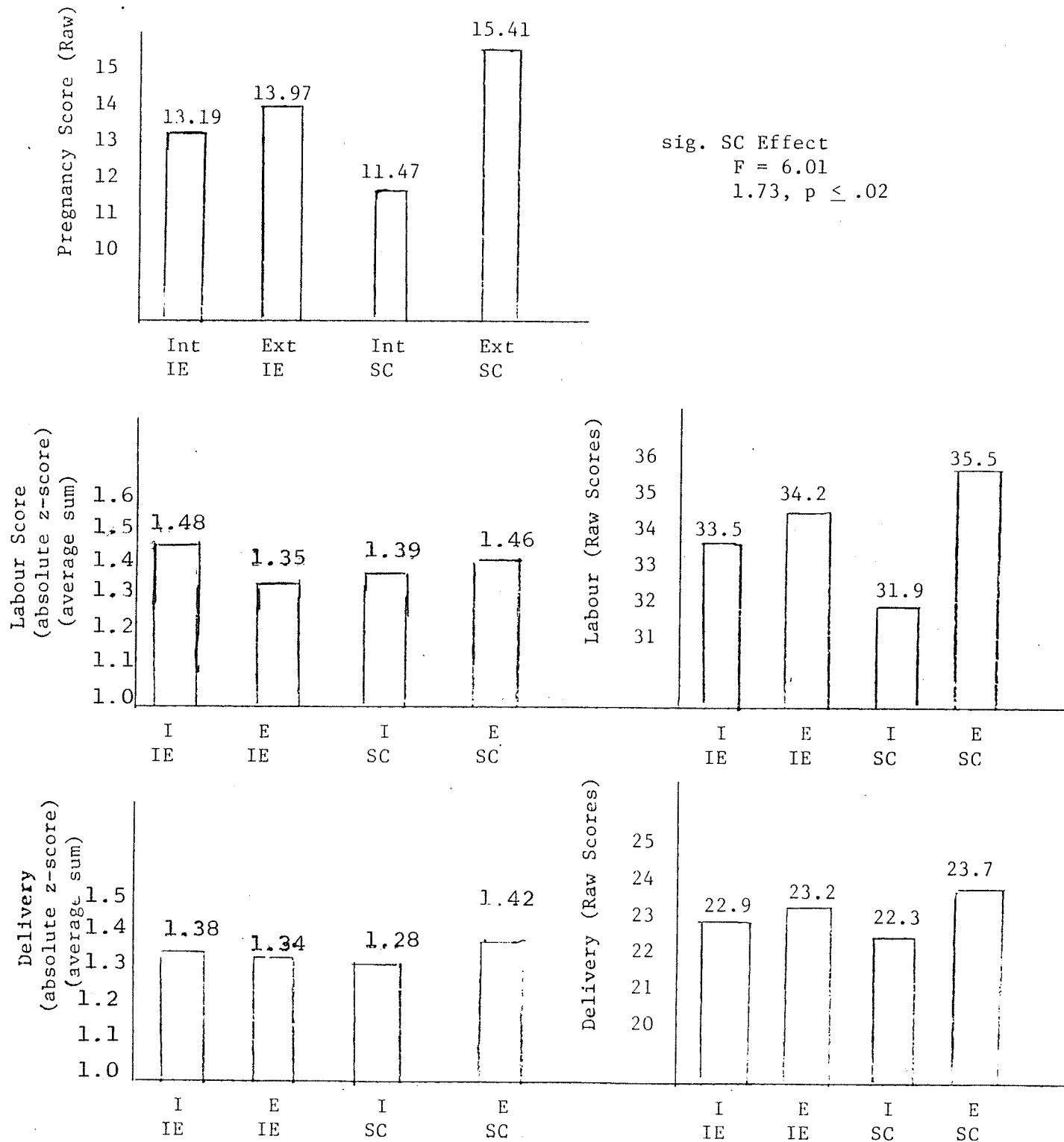
Multiple t tests were run to examine the simple effects of an interaction on this result, using the Bonferroni procedure. None of the six possible combinations of IE and SC reached significance, but a post hoc comparison between those subjects who had consistent locus of control orientation (i.e., Internal on both IE and SC scales, or external on both) vs. those who had inconsistent orientation (i.e., internals on one scale, external on the other), yielded a t of 1.84. This value is significant at the .05 level, but does not reach significance when considered as a more conservative post hoc measure.

One of the questions to be considered in the present experiment was whether the experimental procedure had any effect on the women's pregnancy, labour, and delivery. While such an effect was not expected, a second control group was included which did not go through the experimental procedure. This group was compared to the other three experimental groups in a 4 X 3 ANOVA, with the 4 groups as one factor, and the measures of pregnancy, labour, and delivery as the other.

While Control Group II did have lower labour and delivery scores ($X=27$ vs. 34.7 for the other groups on labor, and $X=20$ vs. 23.2 on delivery), none of these differences were significant ($F<1.80$, $p>.16$).

Figure 3

Pregnancy, Labour and Delivery Scores



sig. interact.
bet. IE - SC
 $p < .05$

The final major Hypothesis (#8) considers response to the relaxation training as a predictor of response to pregnancy, labour, and delivery. EMG data and A-State scores were examined and subjects were divided into high, medium, or low tension reducers on each measure based on the degree of reduction in tension levels from pretest to post-experimental measures. These three levels on both EMG and A-State were considered as independent variables in a 3 X 3 Multivariate Analysis of Variance, with adjustment to pregnancy, labour, and delivery scores as the three dependent variables. It should be noted that the labour and delivery measures used raw scores, rather than Z scores, in this analysis because the hypothesis is not concerned with deviations from the mean.

Results of this analysis showed no significant differences among the three groups of EMG reducers, or among the three levels of self reported anxiety reduction.

Some trends were found for high tension reducers to have more positive pregnancies but more negative labours and deliveries than medium or low tension reducers, but these are merely speculative because of the high alpha levels obtained in the analysis ($p > .28$).

Ancillary Analyses

Tests for Randomization. A number of analyses were run to evaluate the equivalence of the experimental groups and to ascertain normative characteristics of the population measured. These analyses will be presented below.

First, a 4 X 4 ANOVA was run with the four experimental groups (PR, ECF, Control 1, and Control 2) as one factor, and the demographic information (age, education, husband's education, and family income) as the other factor. This analysis showed no differences between experimental groups on each of the four demographic measures (all F's < 1.15, $p > .34$).

Finally, a 2 X 2 X 3 ANOVA was run to assess the randomization of the IE and SC scores across groups. The factors in this analysis were IE, SC, and the 3 experimental groups and results were all nonsignificant (all F's < 1.0).

EMG Measures

There was a significant interaction at Trials X Internal-External ($F=5.0$, $p < .03$, $df=1,41$) on the major analysis of the EMG data. Of interest in this interaction is the differential response of internals and externals over time, so a t test of simple effects was used comparing time at internal vs. time at external. A t value of 2.38 was found which is significant at the .05 level, indicating that externals showed a greater reduction of tension than internals.

There was also a significant 4-way interaction on the EMG analysis involving all 4 factors included, IE, Self Control, group (PR or ECF), on repeated measures ($F=3.9$, $p<.05$, $df=1,41$). While 4-way interactions are difficult to interpret, it was of interest to the present study to see what effects resulted from the various combinations of IE and SC. Therefore, a simple-simple interaction effect (see Kirk, 1968, p. 222) was run on all possible combinations of IE and SC. However, no significant F values were found in this analysis.

On the data analysis of the A-State variable, there was a significant interaction between treatment groups (PR and ECF) and Rotter's IE measures ($F=6.18$, $p<.02$, $df=1,41$).

A simple effects of an interaction was run on IE at treatment. In considering all possible combinations, no significant simple effects were found, although three comparisons approached significance. These were externals vs. internals in the PR condition ($t=2.30$), externals in PR vs. externals in ECF ($t=2.60$), and externals in PR vs. externals in ECF for just the pretest ($t=2.79$). In all of these the greater differences favored externals in the PR condition.

A-State and A-Trait and Obstetrical Measures

Pearson Product Moment Correlation coefficients were computed between prenatal and postnatal measures on the two

self report anxiety scales, A-State and A-Trait, and pregnancy, labour, and delivery scores. The matrix for these correlations is presented in Table 6.

Insert Table 6 about here

As can be seen from the above matrix, the prenatal A-State Scale was significantly correlated with pregnancy and labour scores ($p < .005$, $p = .01$, respectively), as was the prenatal A-Trait scale ($p < .03$, $p < .005$, respectively). Postnatal A-State and A-Trait Scores were significantly correlated with labour scores ($p < .04$, $p < .02$, respectively), with A-State also significantly correlated with delivery scores ($p < .04$).

In addition, the above analysis yielded a measure of the consistency pre- to postnatally for the A-State and A-Trait scales. Both scales remained relatively constant, with pre-post correlations of .34 ($p < .005$) for A-State and .37 ($p = .001$) for A-Trait. Means and standard deviations for both scales pre- and post-natally were almost identical (A-State, $X = 31.0$, pre, $s.d. = 7.26$; 31.47 , post, $s.d. = 7.93$; A trait pre $X = 34.78$, $s.d. = 8.12$, post $X = 33.62$, $s.d. = 7.32$).

Table 6
Correlation Matrix of Principle Measures

	IE	SC	A-State Pre	A-Trait Pre	A-State Post	A-Trait Post	Pregnancy	Labour
IE								
SC	.112							
A-State (Pre)	-.033	.090						
A-Trait (Pre)	-.031	.193	.718***					
A-State (Post)	.238*	-.027	.342**	.262*				
A-Trait (Post)	.216	.071	.378***	.373***	.593***			
Pregnancy	.059	.289**	.328**	.233*	.078	.112		
Labour	.163	.267**	.282**	.344**	.249*	.299**	.210	
Delivery	-.022	.066	.126	.007	.270*	.208	.168	.492***

* - significant at .05 level

** - significant at .01 level

*** - significant at .001 level

(Two-tailed tests)

DISCUSSION

The above results are generally unresponsive of the major hypotheses. The only significant differences in the predicted direction were that the two experimental groups, PR and ECF, showed more reduction than the control group in self-reported anxiety as measured by the A-State Scale, and that internals on the SC Scale had more positive pregnancies than did externals on that scale. However, a number of interesting post hoc findings did emerge from the analyses, in particular that externals overall showed more tension reduction than did internals, a finding opposite what was predicted. In addition, the IE and SC scales appeared to be tapping different dimensions, with IE tending to be more predictive of physiological self control, while SC was more predictive on the obstetrical measures. Considering the two measures together yielded a significant interaction on delivery, with trends in that direction on other measures.

A more specific summary of the major hypotheses is presented below, followed by a more detailed discussion of the above findings.

Summary of Results

Hypothesis 1 predicted an interaction between locus of control and treatment, such that internals would become more relaxed in the progressive relaxation condition, while externals would do so with the experimenter-cued feedback. Results showed that this interaction was not significant.

Hypothesis 2 predicted that in the progressive relaxation condition, internals would show a greater tension reduction than externals. This hypothesis was not supported, with, in fact, a trend in the opposite direction favoring externals as more effective at tension reduction.

Hypothesis 3 made similar predictions to the above hypotheses but with the Self Control Scale. Again, there was no significant interaction between locus of control and treatment, and no difference between internals and externals in the progressive relaxation condition.

Hypothesis 4 compared the two experimental conditions, progressive relaxation and experimenter-cued feedback, with the control group. It was predicted that PR and ECF groups would show more tension reduction than the control group. This prediction was not supported on EMG measures, but was supported on the A-State measures.

Hypothesis 5 concerned the A-State Scales. It was predicted that internals would report a greater decrease in anx-

xiety, whatever the treatment and irregardless of EMG reduction. Results of this analysis were also not significant.

Hypothesis 6 examined locus of control as it related to labour and delivery. It was predicted that internals, on either the IE or SC scales, would show more extreme reactions to labour and delivery than externals. Analyses using absolute Z scores showed no differences between internals and externals on reaction to labour and delivery scores. However, analyses using raw scores showed a trend for internals on the SC scale to have more positive labours, while a significant interaction was found between the IE and SC scales on reaction to delivery, which indicates that Ss who were of consistent locus of control orientations (i.e., similar scores on both scales) had more positive deliveries than did those women of inconsistent locus of control orientations.

Hypothesis 7 predicted internals would have more positive pregnancies than externals. This result was not substantiated on the IE Scale, but a significant difference favoring internals was found on the SC scale.

And finally, Hypothesis 8 considered response to relaxation training as a predictor of reaction to pregnancy, labour and delivery. However, no significant relationship was found between anxiety reduction and obstetrical measures.

Locus of Control and Physiological Self Control

The above findings are generally unsupportive of a relationship between locus of control and progressive relaxation training. Whether progressive relaxation alone, progressive relaxation with experimenter-cued feedback, or sitting in silence was provided, there were no differences between internals and externals on either the IE Scale or Self Control Scales. Results did show a significant overall difference favoring externals to do better than internals, and this difference remains a tendency, although nonsignificant, when looking at the different experimental conditions.

These results differ from Jordan's study (Note 4), but seem consistent with at least some of the biofeedback studies investigating locus of control (i.e., Brown, 1975; Dolacki, 1975; Herzog, 1978; Roca, 1977; Stephenson, Cole & Spann, 1979).

However, these studies used biofeedback, while in the present study a brief form of progressive relaxation training was used in both treatment groups. This training could be seen as a highly structured, directive technique. The subject was essentially told when and where to tense, relax, and pay attention through the constant directions of the trainer. In considering the conclusions of Abramowitz et al. (1979); Friedman and Dies (1974) and Zimet (1979), progressive relaxation could be seen as an approach tailored to externally-oriented subjects.

The research investigating progressive relaxation as a function of locus of control is surprisingly scant. Only Jordan (Note 4), Bunce (1977), and Ollendick and Murphy (1977) studied this area, and each of these studies had sufficient methodological problems to cloud the results.

In proposing the present study, it was felt that the evidence in the literature provided more support for the idea that internals would be effective at any method of relaxation training because they would be more able to control and evaluate their own processes.

However, the results of the present study are more easily explained by the conclusions of Ollendick and Murphy (1977), Abramowitz et al. (1974), Friedman and Dies (1979), and Zimet (1979). Zimet (1979) concludes in his review of locus of control and biofeedback: "It would appear that as long as a highly structural framework is provided for externals and a loosely structured one is provided for internals, biofeedback treatment may be equally effective for both groups" (p. 872-873). In this view, locus of control does not seem to be a determinant of whether subjects are able to control themselves physiologically, but does seem crucial in how such control is to be achieved. Structured, directive approaches would seem most effective with externals, while unstructured, self-directed techniques may be most likely to succeed with internals.

The above formulation receives tentative support by examining the performance of internals and externals in the control condition. Subjects in this group received no input on how to relax, therefore producing a situation which was very unstructured. In this situation, it would be expected that internals would be more effective at producing relaxation, and while the difference is not significant, the trend does favor internals as more effective at tension reduction - this is the only condition in which the trend favored internals over externals at tension reduction.

Experimenter-Cued Feedback

The addition of a tone, operated by the experimenter, which was sounded when subjects were successfully relaxing seemed to have little effect. There was a very slight trend for externals to relax more in this condition than internals (see Figure 1), but this difference was far from significant.

In considering the powerful interaction effect between locus of control and locus of reinforcement found by Baron and Gantz (1972, Baron et al, 1974), and the enhancing effect such feedback had with externals in the Fotopolous (1970) heart rate biofeedback study, the minimal effect of the experimenter-cued feedback is surprising but important.

Comparing the present study to the above studies, one finds a distinct difference in the format of the experimental tasks which may account for the findings. In the Baron and Ganz and Fotopolous studies, the experimental tasks were essentially self directed while in the present study the task was more directed by the experimenter. For example, Baron and Ganz used several form discrimination tasks in which subjects were asked to choose the location of an object from several containers with varying colors and shapes, the goal being for subjects to determine the proper code among the various cues. Subjects made a choice which was verified either by viewing its success (intrinsic reinforcement) or being told by the experimenter (extrinsic reinforcement), but the important variable in this case is that the action was initiated by the subject in a situation which was ambiguous. Cues were not provided on what to look for or how to solve the problem.

Similarly, in the Fotopolous study, subjects were instructed to increase their heart rates, but were not told how to do so. Subjects would therefore be expected to rely upon whatever cues their locus of control would predict, i.e., internals would rely on themselves, while externals would look for outside verification.

In the present study, the task was progressive relaxation training, which (as has been discussed previously), is a

highly structured procedure. Externals would theoretically be focusing on this structure to achieve relaxation, with the belief that their relaxation was a function of the progressive relaxation procedure, rather than being under their own influence. Therefore, experimenter-cued feedback might be viewed by externals as an indication of success or failure of the relaxation procedure, not of their own performance.

It would seem that the interaction of locus of control and form of feedback is only to be expected in situations that are unstructured enough to force externals to seek validation from someone around them. If the task is to follow a highly structured task to achieve some result, extrinsic reinforcement is unlikely to aid externals because they will already be depending upon structure to direct them.

Relaxation Procedure

Tests of the effectiveness of the relaxation procedure itself yielded mixed results. On EMG measures, there were no differences between the two experimental groups and the control group, while the same comparison on the A-State measure showed the experimental groups to report significantly greater relaxation than controls.

In examining the A-State data it is clear that the results are not simply a reflection of an initially high

level of state anxiety which over time returned to baseline. Comparisons with norms reported by Spielberger and Gorsuch (1966) showed the pretest measures on the A-State Scale to be much less than the normative sample in a high-anxiety situation (34.0 vs. 46.4), while the post-relaxation measure was less than that reported by Spielberger and Gorsuch for their relax group (25.7 vs. 28).

However, it is not clear what happened with the EMG measures of relaxation. One possibility comes from comments made by several of the subjects that in doing the tighten, relax sequence of progressive relaxation their babies become more active so that while they felt subjectively more relaxed they were often simultaneously being kicked and poked, which could have led to some additional muscle tension.

Future research might experiment with relaxation methods which did not involve tightening as part of the procedure for pregnant women. Techniques such as hypnosis or imagery would perhaps be useful to prevent the possibility of the above problem occurring.

At any event, one limitation of the present study was that sufficient pilot work testing the procedures used with pregnant women was not carried out. Some of the above drawbacks may have been prevented with such pilot work.

Obstetrical Measures and Locus of Control

Exploring the relationship between obstetrical measures and the two measures of locus of control produced some interesting results. Similarly to Oliver's (1972) study on the expected or experienced nature of labour and delivery, the IE scale was not related to reported ease or difficulty of pregnancy, labour or delivery. In addition internals do not seem to have more variable labours and deliveries than do externals, as found by the Z score analyses.

However, internals on the Feid and Ware Self Control Scale reported significantly more positive pregnancies, with a nonsignificant trend ($F=1.85$, $p<.17$) favoring internals on the labour experience as well. Finally, a significant interaction occurred on the delivery measure which indicated that subjects who were consistent in their locus of control across the two measures (i.e., internal on both the IE and Self Control Scales, or external on both) reported more positive deliveries than subjects who were inconsistent on the two measures of locus of control (i.e., internal on IE and external on Self Control, or vice versa).

The nonsignificant findings on the IE Scale are perhaps understandable when one is viewing issues as complicated as pregnancy, labour, and delivery, which have multiple levels upon which to consider locus of control concepts. For example, labour may be viewed as an event favoring internals, in

that internals tend to be less anxious (i.e., Archer, 1979) and less anxious women tend to have less complicated labours (MacDonald, 1968). It also may favor internals in that the process of labour as taught in the prenatal classes encourages self-directed concentration, breathing, and relaxation which internals may be more effective at monitoring and controlling.

However, the process of labour could also be seen as favoring externals in that much of the time direction is being provided by others (i.e., husbands, nurses, doctors) which, as discussed previously, tends to improve performance of externals and decrease that of internals (i.e., Baron & Ganz, 1972). Externals may also view their labours as under the direction of chance, and therefore feel less anxious about the possibility of loss of control, while internals have been shown to be more reactive to loss of control (i.e., Houston, 1972).

In addition, a host of other non-psychological variables may contribute to the labour experience, especially with primiparae women. These include infant's head size, mother's pelvic size, age of mother, cervix elasticity, the philosophy and approaches of the hospital staff, and husband's presence. These factors all combine to make the experience of labour (and the same case can be made for pregnancy and delivery) more complicated than can be pred-

icted by where the woman generally looks for social reinforcements and direction.

The significant findings for the Self Control Scale seem encouraging. While insufficient research has been done to consider characteristics found with internals and externals on this scale, it would seem that internals on Reid and Ware's Scale experienced more positive pregnancies than externals. These results support Hypothesis 7, so it would seem that those women who characterized themselves as more in control of their actions and impulses have more positive experiences in a novel situation requiring a great deal of self control (i.e., diets, specific exercises, prenatal practicing, avoiding fatigue).

A similar, but nonsignificant trend appears for experiences of labour with internals and externals on the Self Control Scale. As discussed above, labour is a more complicated, stressful event than pregnancy, and it appears that while women who are internal on the Self Control Scale may tend to have an advantage over externals in their experience of labour, these other complicating factors make this advantage less clear. In other words, ease of labour is not just a function of controlling oneself. Such control appears to be helpful, but certainly not sufficient, in facilitating labour.

For delivery, the I-E and Self Control Scales interact in a very interesting way. It appears that the crucial variable here is congruity between the two scales: women who felt generally responsible for what happened to them and who also felt personally in control of their actions (i.e., internal on both scales), or women who expected events to occur by chance and did not believe themselves to be in control of their own impulses (i.e., external on both scales) reported the most positive deliveries. Conversely, women who were of mixed locus of control orientations experienced more difficult deliveries.

While further research is needed to investigate these findings, it may be speculated that, compared to pregnancy and labour, delivery is a situation with more intricate demands requiring aspects of both personal self control and expectations about social control. In considering what occurs during delivery as compared to labour, it does appear that such demands exist. When a woman enters delivery following the transition stage, she usually is experiencing less discomfort than previously (Chertak, 1969). The event is normally less stressful, less traumatic, and more focused, but demands the woman to deal with both her own functioning (i.e., certain breathing to prevent bearing down and relaxing muscles in the birth canal if possible, eventually pushing with contractions) and also to interact in some way with a number of people, all potentially giving direc-

tions (doctor, nurses, anesthetist, husband). A congruently internal woman might expect to control herself and also would look primarily to herself for direction and confirmation of effort. While a congruently external woman would not expect to be in control, but would look for direction and affirmation to be provided by those around her. However, women incongruent in their locus of control might have difficulty matching their expectations to the demands of the situation. For example, a woman internal on the Self Control Scale but external on the IE Scale could expect to be in control of herself but expect what happens to her to be due to chance and therefore under the direction of those around her. Likewise, an external on the Self Control Scale who is internal on the IE Scale would not expect to be in control of herself but could be looking to herself for confirmation of how she is doing. While it is difficult to conceptualize these incongruent orientations, it does seem that these beliefs conflict, especially in a situation like delivery where both internal and social demands exist.

Further research needs to be carried out to investigate these findings. It is especially important to study the interaction between the IE Scale and the Self Control Scale in more controlled situations. It also would be valuable to examine this relationship with other forms of psychosomatic illnesses.

Self-Reported Anxiety and Obstetrical Measures

As expected, there was some positive relationship between self-reported anxiety and obstetrical measures. Prenatal scores on the A-State and A-Trait Scales were both significantly related to adjustment to pregnancy and labour measures, but not to delivery adjustment. Postnatal scores on A-State and A-Trait were unrelated to pregnancy measures, but were related to labour scores, with A-State also being significantly related to delivery scores.

Similar findings have frequently been reported in the obstetrical literature. For example, Erickson (1976) found "expressed fears, anxiety and dependency" as the best predictors of later obstetrical complications. Crandon (1979) found high anxiety women, as measured by the IPAT, to be significantly more likely to have pre-eclamptic toxemia, prolonged labour, precipitate labour, and clinical fetal distress than a group of normally anxious women. MacDonald (1968), in reviewing the literature, found anxiety measures to be related to a wide variety of obstetrical disorders and multiple complications.

The above results, therefore, do not add anything new to the existing findings, but do underscore the interrelationship between emotional distress and physical disorders. When such a consistent pattern exists between maternal anxiety and a variety of obstetrical complications, it would

seen advisable to use self-reported anxiety measures early in pregnancy to identify high-risk women and to spend more time with them in providing relaxation training, stress management, and emotional support. Such preventative action might avert some of the stress-related disorders, and would be a step in the direction of providing interventions for specific risk women rather than a shotgun approach, with the same general training provided for all women. Prenatal classes could use anxiety scales as part of their admission information, and provide more intensive training for high anxiety women.

These speculations need to be studied in more clinically-oriented research. While the interrelationship between anxiety and obstetrical complications has been reported for years, no one has attempted to modify in an organized way the level of anxiety in high-anxious women to see if these complications can be prevented. Simply to identify a relationship is meaningless unless that relationship is followed with attempts at intervention based on its findings. Work with other areas of physical disturbance has been fruitful in altering emotional and attitudinal variables in a preventative way, such as Suinn's (1975) work, in altering Type A cardiac risk patients to a more relaxed Type B, thus decreasing the likelihood of a heart attack.

One additional point is that the Self Control Scale was equally predictive of obstetrical adjustment, but in the multiple regression analysis it was not significantly related to A-State or A-Trait. Therefore, the Self Control Scale is tapping a different portion of the variance than the anxiety measures, so that considering SC with A-State or A-Trait may be more effective in predicting obstetrical response.

Response to Relaxation Training as a Predictor of Obstetrical Complication

It appears that response to a single session of relaxation training has little predictive ability with adjustment to pregnancy, labour and delivery. It was thought that women who were able to use whatever cues were provided to reduce their levels of tension may also be those women who were most likely to achieve the necessary self control in pregnancy, labour, and delivery. However, this was not the case, with insignificant F values reported for all comparisons.

It may be that achieving reduction in tension in a controlled, experimental setting is a different task than doing so in a stressful, painful, and potentially life-threatening situation. Again, pregnancy, labour, and delivery are highly complex events, and measures of response to relaxa-

tion training would seem to be too inferential to be of much use. In addition, the process of providing the relaxation training and evaluating the response is a rather lengthy procedure, so that utility of such a measure would be minimal even if it were predictive.

The Internal-External and Self-Control Scales

It is now clear that the Self Control Scale devised by Reid and Ware (1973, 1974) involves a different dimension within the locus of control construct than does the I-E Scale. Scores by the same women on both scales were essentially uncorrelated ($r=.11$), and were distributed relatively evenly across all possible combinations of the two scales. In addition, the scales contributed differently to the results, the IE Scale being more discriminating with the relaxation training procedure, while the Self Control Scale was more effective at predicting response to pregnancy, labour, and delivery.

What was also interesting was that the scales produced an interaction effect on delivery, and had trends toward such effects on other measures (pregnancy, EMG tension reduction) which indicated that the scales would be useful in other studies when considered together.

While the above results provide further support for the locus of control construct as a multidimensional concept,

that issue has already been well documented (i.e., Gurin et al., 1969; Lao, 1970; Levenson, 1972; Minds, 1970). What is important in the results is that considering the IE and Self Control scales together provided a great deal more information than either scale would have in isolation. It would seem that in considering complex phenomena or in exploring new areas with the locus of control construct, it would be advisable to include both a generalized measure of locus of control and a more unidimensional measure tapping as closely as possible the specific area being considered.

Rotter (1975) seems correct in his defense of the IE Scale as a generalized measure being useful as a broadband measurement, even though more specialized scales may tap specific areas more effectively. Certainly in the present study, the IE Scale was more predictive in the relaxation training, and the results of that section seem to fit conceptually into the generalized view of locus of control. However, the Self Control Scale is also promising in predicting areas related to control of oneself and clearly warrants further investigation.

A-State and A-Trait Stability

The present study allowed for an investigation of the relative stability of the A-State and A-Trait Scales over a time in which women undergo dramatic physiological, emotional, and social changes. According to Spielberger

(1972), A-Trait anxiety is a person's predisposition to react anxiously across varied situations, and as such should be a stable and enduring characteristic. A-State is considered to be the specific anxiety response to what is seen as a threatening situation; it is expected to vary across conditions and to be more reactive.

Therefore, A-Trait would be expected to remain relatively stable from the last trimester of pregnancy to sometime postpartum, while A-State may vary, depending on the degree of ego-involved threat perceived at either period measured.

As expected for A-Trait but not for A-State, normative data show both anxiety scales to be quite stable. Means and standard deviations for both scales were almost identical pre- to post-natally. However, correlation coefficients pre- to post were somewhat low ($r=.37$, A-Trait, $r=.34$, A-State), as compared to Spielberger's test-retest correlations of $r=.83$ for A-Trait and $r=.84$ for A-State, indicating that there were individual shifts in scores in spite of the similar norms.

An examination of the individual A-State and A-Trait records showed that this appeared to be the case. Rather than remaining stable across measurement periods, approximately half of the subjects showed increases in A-State pre- to post-natally, while the other half showed a decrease. A similar redistribution occurred for A-Trait. These shifts are effectively cancelled out when summed.

These findings challenge the concept of A-Trait as a measure of a relatively enduring, stable tendency to respond to a variety of situations anxiously. Women who before the birth of their child reported a certain degree of tendency toward anxiety would not necessarily report this same tendency postnatally.

Two interpretations qualify these findings as evidence against the nature of the A-Trait concept. First, the initial measure of the A-Trait was taken during the woman's third trimester of pregnancy. While the instructions on the A-Trait scale ask that the questions be answered according to how a person generally feels, the basis of answering these questions for the women in the study was six months of pregnancy. It could be argued that at least for a portion of the sample, pregnancy was a time when the women did not feel the same general tendency toward anxiety. Nor is it possible to predict which direction a change in trait anxiety may take during pregnancy. Many pregnant women report a pervasive feeling of security, a realignment of values that sees home and family life taking precedence over outside interests, and a feeling of peacefulness. Other women are threatened and uncomfortable with being increasingly tied down with their advancing pregnancy, seeing themselves as often able to do less physically, often having to give up their jobs toward the end of pregnancy, and feeling less attractive and competent.

All of these issues may be more a function of pregnancy than of a woman's generalized tendency toward anxiety, yet could be seen by the person as a reflection of how she generally felt. Therefore, there would be an influence on the A-Trait measure during pregnancy which would not be evident in the postpartum measure of A-Trait.

The finding of individual shifts on A-State leads to some interesting questions. Instead of the usual reports of a decrease in anxiety from the last trimester of pregnancy to postnatal measures (i.e., Grimm, 1967), almost half of the subjects reported an increase in anxiety across these two measurements, while the other half reported the expected decrease. It would be valuable to investigate these findings further to see what locus of control characteristics are evident from the women who reported an increase in A-State anxiety. Also of interest is the question of how was the woman's labour and delivery related to her anxiety postpartum. Correlational findings showed that the postpartum A-State is significantly and positively related to both labour and delivery measures, so those women feeling more anxious after their babies were born were also likely to be the women who experienced the most difficult labours and deliveries.

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APPENDIX A

Dear Expectant Mother,

This letter concerns a research project which you may have been contacted about by your prenatal class. This project is part of my doctoral dissertation in the Department of Psychology at the University of Manitoba. What I am interested in is looking at ways to make parts of prenatal training more effective by relating information from scales and questionnaires to the experience of pregnancy and childbirth. In addition, I want to study certain training methods used in various prenatal classes.

What this involves for you, if you agree to participate, is filling out the enclosed questionnaires and mailing them to me as soon as possible. At some point in the near future (before class starts), I will contact you to arrange an appointment at the Health Sciences Centre for the portion training methods. This portion will take less than one hour and does not involve blood analysis, physical examination, or anything painful or harmful. As a last resort, transportation can be provided.

The last segment involves filling out and mailing to me a short questionnaire after you deliver your baby. The total time involved, therefore, should be no more than two hours.

As I said before, participation is voluntary and has no bearing on you taking the prenatal class for which you are registered. All information will be kept strictly confidential and you will be free to discontinue your participation at any time. If you do not wish to participate, please return the questionnaire provided.

Thank you for letting me contact you. I hope you agree to participate in the study. If you have any questions or problems you can contact me at 284-7620. If not, please fill out the enclosed material and mail it to me as soon as possible.

H. Richard Griffin, M.A.
University of Manitoba
Department of Psychology

P.S. Please be sure to fill out both sides of the pages of the questionnaires.

APPENDIX A

PRENATAL QUESTIONNAIRE

Name:

Age:

Address:

Phone:

Physician:

I History

1. Date due to deliver: _____
2. Where will you be attending prenatal classes? _____
3. Hospital in which you will deliver: _____
4. Education (Check appropriate category)

Own:	Grade 8 or less _____	Husband's:	Grade 8 or less _____
	Grade 9 - 11 _____		Grade 9 - 11 _____
	Grade 12 _____		Grade 12 _____
	Some university _____		Some university _____
	Undergrad. degree _____		Undergrad. degree _____
	Graduate degree _____		Graduate degree _____
5. Estimated annual family income:

Less than \$5000 _____
\$5000 - \$10,000 _____
\$11,000 - \$15,000 _____
Over \$15,000 _____

II Gynecological History

1. On the following scale, please rate the amount of discomfort that you usually feel as a result of menstrual cramps. Place a check mark on the space which best represents the discomfort you feel.

Very little						Extreme
discomfort						discomfort
<u> 1 </u> :	<u> 2 </u> :	<u> 3 </u> :	<u> 4 </u> :	<u> 5 </u> :	<u> 6 </u> :	<u> 7 </u> :
2. Have you had previous pregnancies which ended in miscarriage? Circle the number of miscarriages you have had.

0 1 2 3 4 5 6 more than 6
3. Was your present pregnancy planned? Yes 1 No 0
4. On the following scale, please rate how difficult your present pregnancy has been for you. Place a mark on the space which best represents the degree of difficulty you have had.

Very						Very
easy						difficult
<u> 1 </u> :	<u> 2 </u> :	<u> 3 </u> :	<u> 4 </u> :	<u> 5 </u> :	<u> 6 </u> :	<u> 7 </u> :

5. Did you seek or receive treatment from your physician for any of the following problems during this pregnancy? (Place a check in the first column for items which apply.)

Asked or received treatment for Check here for problems experienced but did not seek help for.

- | | | |
|----------------------------------|-------|-------|
| 1. headaches | _____ | _____ |
| 2. excessive vomiting | _____ | _____ |
| 3. high blood pressure | _____ | _____ |
| 4. nervousness | _____ | _____ |
| 5. toxemia | _____ | _____ |
| 6. fatigue | _____ | _____ |
| 7. swelling | _____ | _____ |
| 8. depression | _____ | _____ |
| 9. bleeding | _____ | _____ |
| 10. excessive weight gain | _____ | _____ |
| 11. Other (Please specify) _____ | _____ | _____ |

add up checks on each column

6. Place a check in the second column for problems which you experienced but did not seek or receive treatment for.

7. Did you take medication for any of the following problems during this pregnancy? How long?

0 = none
-9 = # of months medication taken

- | | | |
|---|-------|-------|
| 1. morning sickness | _____ | _____ |
| 2. nervousness | _____ | _____ |
| 3. bleeding | _____ | _____ |
| 4. headaches | _____ | _____ |
| 5. problems sleeping | _____ | _____ |
| 6. Other medications taken (Please specify) _____ | _____ | _____ |

Were these medications prescribed by your physician?

Yes _____ Which ones? _____
No _____ Which ones? _____

8. What sources has the information you know about pregnancy and childbirth come from? Rank the order of influence, putting a 1 after the source which had the greatest influence, a 2 after the next, and so on.

- books _____
- magazines _____
- friends _____
- your mother _____
- other relatives _____
- your doctor _____
- other (Please specify) _____

9. How well informed would you say you are about pregnancy and childbirth?

Not very well informed Very well informed
7 : 6 : 5 : 4 : 3 : 2 : 1 :

SELF-EVALUATION QUESTIONNAIRE

Directions: A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number 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 best seems to describe your feelings right now.

	Not at all	Somewhat	Moderately 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

SELF EVALUATION QUESTIONNAIRE PART II

Directions: A number of statements which people have used to describe themselves appear below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you generally feel. Again, there are no right or wrong answers. Do not spend too much time on any one statement, but be sure to give how you feel generally.

	Not at all	Somewhat	Moderately so	Very much so
1. I feel pleasant		2	3	4
2. I tire quickly		2	3	4
3. I feel like crying	1	2	3	4
4. I wish I could be as happy as others seem to be		2	3	4
5. I am losing out on things because I can't make up my mind soon enough	1	2	3	4
6. I feel rested		2	3	4
7. I am "calm, cool and collected"		2	3	4
8. I feel that difficulties are piling up so that I cannot overcome them		2	3	4
9. I worry too much over something that really doesn't matter	1	2	3	4
10. I am happy	1	2	3	4
11. I am inclined to take things hard	1	2	3	4
12. I lack self-confidence	1	2	3	4
13. I feel secure	1	2	3	4
14. I try to avoid facing a crisis or difficulty	1	2	3	4
15. I feel blue	1	2	3	4
16. I am content	1	2	3	4
17. Some unimportant thought runs through my mind and bothers me		2	3	4
18. I take disappointments so keenly that I can't put them out of my mind	1	2	3	4
19. I am a steady person	1	2	3	4
20. I get in a state of tension or turmoil as I think over my recent concerns and interests	1	2	3	4

SOCIAL REACTION INVENTORY

This is a questionnaire to find out the way in which certain events in our society affect different people. Each item below consists of a pair of alternatives lettered a or b. Please select the one statement of each pair (and only one) which you more strongly believe to be the case as far as you're concerned. Place an X beside either a or b, whichever you choose as the statement most true. Be sure to select the one you actually believe to be more true rather than the one you think you should choose or the one you would like to be true. This is a measure of personal belief; obviously there are no right or wrong answers.

1. a. Children get into trouble because their parents' punish them too much.
 b. The trouble with most children nowadays is that their parents are too easy with them.
2. a. Many of the unhappy things in people's lives are partly due to bad luck.
 b. People's misfortunes result from the mistakes they make.
3. a. One of the major reasons why we have wars is because people don't take enough interest in politics.
 b. There will always be wars, no matter how hard people try to prevent them.
4. a. Even when there was nothing forcing me, I have found that I will sometimes do things I really did not want to do.
 b. I always feel in control of what I am doing.
5. a. In the long run people get the respect they deserve in this world.
 b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.
6. a. The idea that teachers are unfair to students is nonsense.
 b. Most students don't realize the extent to which their grades are influenced by accidental happenings.
7. a. Without the right breaks one cannot be an effective leader.
 b. Capable people who fail to become leaders have not taken advantage of their opportunities.
8. a. No matter how hard you try some people just don't like you.
 b. People who can't get others to like them don't understand how to get along with others.
9. a. Heredity plays the major role in determining one's personality.
 b. It is one's experiences in life which determine what they're like.
10. a. Sometimes I impulsively do things which at other times I definitely would not let myself do.
 b. I find that I can keep my impulses in control.
11. a. I have often found that what is going to happen will happen.
 b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.
12. a. In the case of the well prepared student there is rarely if ever such a thing as an unfair test.
 b. Many times exam questions tend to be so unrelated to course work that studying is really useless.

13. ___ a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.
___ b. Getting a good job depends mainly on being in the right place at the right time.
14. ___ a. The average citizen can have an influence in government decisions.
___ b. This world is run by the few people in power, and there is not much the little guy can do about it.
15. ___ a. When I make plans, I am almost certain that I can make them work.
___ b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow.
16. ___ a. When I put my mind to it I can constrain my emotions.
___ b. There are moments when I cannot subdue my emotions and keep them in check.
17. ___ a. There are certain people who are just no good.
___ b. There is some good in everybody.
18. ___ a. In my case getting what I want has little or nothing to do with luck.
___ b. Many times we might just as well decide what to do by flipping a coin.
19. ___ a. People cannot always hold back their personal desires: they will behave out of impulse.
___ b. If they want to, people can always control their immediate wishes, and not let these motives determine their total behaviour.
20. ___ a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.
___ b. Getting people to do the right thing depends upon ability, luck has little or nothing to do with it.
21. ___ a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand, nor control.
___ b. By taking an active part in political and social affairs the people can control world events.
22. ___ a. Most people don't realize the extent to which their lives are controlled by accidental happenings.
___ b. There really is no such thing as "luck."
23. ___ a. Although sometimes it is difficult, I can always willfully restrain my immediate behaviour.
___ b. Something I cannot do is have complete mastery over all my behavioural tendencies.
24. ___ a. One should always be willing to admit mistakes.
___ b. It is usually best to cover up one's mistakes.
25. ___ a. It is hard to know whether or not a person really likes you.
___ b. How many friends you have depends upon how nice a person you are.
26. ___ a. In the long run the bad things that happen to us are balanced by the good ones.
___ b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

27. ___ a. With enough effort we can wipe out political corruption.
___ b. It is difficult for people to have much control over the things politicians do in office.
28. ___ a. It is possible for me to behave in a manner very different from the way I would want to behave.
___ b. It would be very difficult for me to not have mastery over the way I behave.
29. ___ a. Sometimes I can't understand how teachers arrive at the grades they give.
___ b. There is a direct connection between how hard I study and the grades I get.
30. ___ a. A good leader expects people to decide for themselves what they should do.
___ b. A good leader makes it clear to everybody what their jobs are.
31. ___ a. Many times I feel that I have little influence over the things that happen to me.
___ b. It is impossible for me to believe that chance or luck plays an important role in my life.
32. ___ a. People are lonely because they don't try to be friendly.
___ b. There's not much use in trying too hard to please people, if they like you, they like you.
33. ___ a. Self-regulation on one's behaviour is always possible.
___ b. I frequently find that when certain things happen to me I cannot restrain my reaction.
34. ___ a. There is too much emphasis on athletics in high school.
___ b. Team sports are an excellent way to build character.
35. ___ a. What happens to me is my own doing.
___ b. Sometimes I feel that I don't have enough control over the direction my life is taking.
36. ___ a. Most of the time I can't understand why politicians behave the way they do.
___ b. In the long run the people are responsible for bad government on a national as well as on a local level.
37. ___ a. When I make my mind up, I can always resist temptation and keep control of my behaviour.
___ b. Even if I try not to submit, I often find I cannot control myself from some of the enticements in life such as over-eating or drinking.

Name _____

Date _____

Appendix B

POSTPARTUM QUESTIONNAIRE

1. Now that your pregnancy is over, we would like to know your feelings about it. In using the scales below, place an X in the space which most accurately represents your experience. The spaces represent the following ratings:

very much related to this end : quite closely related : only slightly : neutral : only slightly : quite closely : very much related to this end

with items to the left of neutral representing increasing relatedness to the description on the left, and items on the right of neutral representing increasing relation to the description on the right. Place only one X for each scale. Remember, try to rate each scale as it most accurately applies to you.

1. On the scale below, rate the degree of discomfort you felt during pregnancy. While all pregnancies have moments of extreme or little discomfort, try to rate your average or overall degree of discomfort.

very little discomfort : 1 : 2 : 3 : 4 : 5 : 6 : 7 : very much discomfort

2. On the following scale, rate your general emotional reaction to pregnancy.

very negative : 7 : 6 : 5 : 4 : 3 : 2 : 1 : very positive

3. On the next scale, rate your overall (emotional and physical) reaction to your pregnancy.

very negative : 7 : 6 : 5 : 4 : 3 : 2 : 1 : very positive

4. How much weight did you gain during your pregnancy? _____
Was this considered excessive? Yes 1 No 0 Don't know _____

5. Since you filled out the first questionnaire for this study, did you develop any of the following problems during pregnancy for which you sought or received treatment by your physician? (Place check in the first column for the items which apply.)

up
ks in
column

	Problems which you asked for or re- ceive treatment	Check here for problems experienced but did not seek help for
1. headaches	_____	_____
2. excessive vomiting	_____	_____
3. high blood pressure	_____	_____
4. nervousness	_____	_____
5. bleeding	_____	_____
6. toxemia	_____	_____
7. excessive fatigue	_____	_____
8. constipation	_____	_____
9. swelling	_____	_____
10. depression	_____	_____
11. excessive weight gain	_____	_____
12. other (please specify _____)	_____	_____

6. Place a check in the second column for problems which you experienced during your last few weeks of pregnancy but did not seek help for.

II. Birth Data

1. On what date did you deliver? _____
 Was this early 1
 on time 2
 late 3
 If early or late, how much so # weeks

2. What was your child's birth weight? _____

3. Was your child: a boy _____ a girl _____
 single birth _____ twins _____

4. Did your child have any problems or complications at birth or while in the hospital? Yes 1 No 0
 If yes, please specify.

5. Was your child delivered by Caesarean section? Yes 1 No 0
 If yes, you do not need to fill out the remaining sections.

III. Labour Data

1. Did you go to the hospital for what turned out to be false labour?
 Yes 1 or # _____ No 0 Don't know _____ If yes, how many times? _____
 of times

2. Was your labour induced artificially? Yes 1 No 0 Don't know _____

3. Was your husband present during labour? Yes 1 No 0

4. Did you receive medication for pain during labour? Yes 1 No 0 Don't know _____

5. Relative to other women's labours, rate how much medication you felt you received.

much less
than most

much more
than most

7 : 6 : 5 : 4 : 3 : 2 : 1 :

6. The following items are concerned with your experience of labour. Try to recall your labour as vividly as you can, then rate the nature of your experience during labour on each of the following scales. Try to rate what it was generally like for you during labour. Following the previous instructions in using these scales.

a. I was
panicked

I was in
control

7 : 6 : 5 : 4 : 3 : 2 : 1 :

b. Labour
was very
painful

Labour was
quite painless

7 : 6 : 5 : 4 : 3 : 2 : 1 :

c. I had no
help during
labour

I had all
the help I needed
during labour

7 : 6 : 5 : 4 : 3 : 2 : 1 :

d. I felt
confident

I felt
helpless

7 : 6 : 5 : 4 : 3 : 2 : 1 :

e. I felt I was
not doing what
I should have
been doing

I felt I was doing
everything I should
been doing

7 : 6 : 5 : 4 : 3 : 2 : 1 :

f. I had complete
trust and faith in
the doctors and
nurses

I had little
or no trust
in the doctors
and nurses

7 : 6 : 5 : 4 : 3 : 2 : 1 :

g. I was annoyed
with the nurses

I had pleasant feelings
toward the nurses

7 : 6 : 5 : 4 : 3 : 2 : 1 :

h. I felt good about
the way I was behaving
during labour

I felt bad about the
way I was behaving
during labour

7 : 6 : 5 : 4 : 3 : 2 : 1 :

i. I had a very easy labour _____ : _____ : _____ : _____ : _____ : _____ : _____ : I had a very difficult labour _____ :
7 : 6 : 5 : 4 : 3 : 2 : 1 :

j. labour was much different than I expected it to be _____ : _____ : _____ : _____ : _____ : _____ : _____ : labour was just like I thought it would be _____ :
7 : 6 : 5 : 4 : 3 : 2 : 1 :

IV. Delivery Data

1. Did you have an episiotomy? Yes 1 No 0 Don't know _____

2. Were forceps used during delivery? Yes 1 No 0 Don't know _____

3. Was your husband present during delivery? Yes 1 No 0

4. Were you conscious during delivery? Yes 1 No 0

5. How long was it from the time your labour contractions began until you delivered? If you aren't sure, give the approximate number of hours.
 # hours _____ Score 0-8=1 16-20=3 31+=5
 9-15=2 21-30=4

6. Did you receive medication or anesthesia for pain during delivery?
 Yes _____ No 0 Don't know _____
 If yes, check which type below.
 Needle 3 Other _____
 Gas (through mask over face) 1
 Spinal - needle in back put in by anesthetist 4
 Pill 2

7. The following items concern your experience of the delivery of your child. Try to recall the event of delivery, then rate your experience on the following scales. As on the labour scales, put an X in the space which represents your general experience on each of the delivery items.

a. Delivery was very painful for me _____ : _____ : _____ : _____ : _____ : _____ : _____ : Delivery was quite painless for me _____ :
7 : 6 : 5 : 4 : 3 : 2 : 1 :

b. I felt I was not in control during delivery _____ : _____ : _____ : _____ : _____ : _____ : _____ : I felt I was in control during delivery _____ :
7 : 6 : 5 : 4 : 3 : 2 : 1 :

c. I trusted the doctors and nurses _____ : _____ : _____ : _____ : _____ : _____ : _____ : I had little trust in the doctors and nurses _____ :
1 : 2 : 3 : 4 : 5 : 6 : 7 :

- d. I felt joy I felt disappointment
1 : 2 : 3 : 4 : 5 : 6 : 7 :
- e. I felt good I felt bad
 about the way about the way
 I was behaving I was behaving
 during delivery during delivery
1 : 2 : 3 : 4 : 5 : 6 : 7 :
- f. I had a I had a
 very easy very difficult
 delivery delivery
1 : 2 : 3 : 4 : 5 : 6 : 7 :
- g. Delivery was Delivery was
 much different just like I
 than I thought thought it
 it would be would be
7 : 6 : 5 : 4 : 3 : 2 : 1 :

8. Did you find the breathing exercises taught in your prenatal class helpful?
 Yes 1 No 0
9. Did you find the relaxation exercises from your class helpful? Yes 1 No 0

V. Postpartum

1. Did you experience feelings of depression during the days immediately following the birth of your child? Yes 1 No 0 Rate the degree of depression.
 No depression Very depressed
1 : 2 : 3 : 4 : 5 : 6 : 7 :
2. Are you breastfeeding your baby? Yes 1 No 0
3. Rate the ease with which you and your husband are adjusting to parenthood.
 We are having We are having a
 an easy adjustment difficult adjustment
1 : 2 : 3 : 4 : 5 : 6 : 7 :
4. Has your experience of childbirth changed your decision about having additional children? Yes 1 No 0 How?

Thank you for filling out this questionnaire. Please mail this along with the other material to me in the enclosed envelope as soon as possible.

Appendix C

Frequency Distributions of Demographic Data According to Group

