A PSYCHOMETRIC ANALYSIS OF THE SELF-REPORT OF LABOR PAIN

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LIST OF ABBREVIATIONS

AL	Active labor
BP	Blood pressure
CEI	Childbirth Experience Interview
EL	Early labor
HR	Heart rate
LA&DAS	Labor Agency and Delivery Agency Scale
LDR	Labor delivery room
MANOVA	Multivariate analysis of variance
MAP	Mean arterial pressure
MPQ	McGill Pain Questionnaire
NSVD	Normal spontaneous vaginal delivery
PPI	Present Pain Intensity
PPM	Psychoprophylactic method
PRI	Pain Rating Index
SELQ	Self-evaluation in Labor Questionnaire
SNK	Student-Newman-Keuls test
SS	Second stage
STAI	State-trait Anxiety Inventory

SUMMARY

Investigations of the complexities of parturition pain have revealed few consistent relationships between pain during childbirth and a variety of psychosocial and physiologic variables. Although pain during labor is positively associated with increasing cervical dilatation and frequency of uterine contractions, extremely wide individual variations in pain intensity exist. Variables which have not shown consistent relationships with parturition pain include maternal age, parity, race, social status, childbirth preparation, and prenatal attitudes toward childbirth. The ability of a woman to maintain a sense of control during the labor and delivery process has been consistently associated with decreased pain supporting a mastery model of the birth experience.

A review of the research literature revealed that parturition pain has been measured by four general methods: dolorimetry; retrospective participant observer on ordinal scales; retrospective self-report on interviews, ordinal scales, and visual analogues; and in-labor self-report on ordinal scales, visual analogues, and the McGill Pain Questionnaire. Of the 31 identified research reports published after 1945, 21 used retrospective report of a participant observer or the subject to measure the pain of labor. The inconsistency of research findings in this body of literature may be partially a result of the measurement error inherent in these various measurement operations.

This non-experimental, field study investigated the reliability and validity of instruments to measure pain during labor and the relationships among the pain measures and a number of selected antecedent, intervening, and labor related phenomena. A convenience sample of 50, low-risk, married parturients between the ages of 19 and 39 were subjects for the study. A psychometrically tested instrument, the McGill Pain

Questionnaire, was used to elicit pain report during the early, active, and transitional phases of the first stage of labor and immediately after the second stage of labor. Additional labor data provided measures of state anxiety, confidence in ability to handle labor, fear of pain, concern regarding the outcome of labor, cervical dilatation, blood pressure, and heart rate.

During the postpartum hospitalization, the subjects recalled and reported their labor pain on the McGill Pain Questionnaire; were interviewed about their labor and delivery experience; and provided retrospective data on their state anxiety, confidence in ability to handle labor, fear of pain, concern regarding the outcome of labor, feelings of control during labor and delivery, and birth enjoyment.

The convergence between in-labor and postpartum pain report on the McGill Pain Questionnaire (MPQ) was investigated by repeated measures analysis of variance using the MANOVA approach. The postpartum means on the ordinal Present Pain Intensity scale of the MPQ were found to be significantly different than the in-labor means. Although pain report for the second stage was found to be highly congruent, postpartally the subjects tended to devaluate the pain of early and active labor on the ordinal scale. In contrast, pain report on the multidimensional Pain Rating Index of the MPQ was found to be statistically congruent with in-labor data. Significant interaction effects however showed a tendency for the women to devaluate the pain of early labor and inflate the pain of transitional labor in their postpartal report.

The 17 nulliparaous parturients in the sample, 16 of whom had taken Lamaze childbirth preparation classes, experienced greater pain during early labor but less pain during seond stage than the 33 multiparas. When the sample was divided as unprepared,

Lamaze prepared, or previously Lamaze prepared, the Lamaze prepared women experienced significantly more pain during early labor than previously Lamaze prepared women, while the unprepared women experienced significantly more pain than the Lamaze prepared women during the second stage of labor.

Significant predictors of in-labor pain reports were confidence in ability to handle labor for early labor; fear of pain, anxiety, and confidence for active labor; confidence and feelings of control for transitional labor; and childbirth preparation, parity, and control for second stage. In contrast, significant predictors of postpartum pain reports were parity and state anxiety for early labor; feelings of control for active labor; parity and confidence in ability to handle labor for transitional labor; and fear of pain and feelings of control for second stage. These findings, plus the pattern of intercorrelations among the variables for different labor phases and times of data collection, suggested that postpartum measurement does not reflect the same relationships among constructs as identified from intrapartal measures.

Measures of pain and anxiety from the postpartum data were studied for their convergent and discriminant validity by a multitrait-multimethod matrix. Excessive common method variance between the questionnaire methods for pain and anxiety and insufficient common factor variance between the two measures of each construct suggested the need for additional investigation into the measurement operations of these two commonly studied phenomena.

The study findings indicated that a portion of the inconsistency of findings in childbirth research may be explained by measurement operations and timing. Additional

investigation is suggested into the differential features of the pain experience of nulliparous and multiparous women during labor; labor related fears and their relationship with state anxiety and pain during labor; and phenomena affecting transitional and second stage labor.

And a woman spoke, saying,
Tell us of Pain.

And he said:
Your pain is the breaking of the shell
that encloses your understanding.
Even as the stone of the fruit must break,
that its heart may stand in the sun,
so must you know pain.
And could you keep your heart in wonder
at the daily miracles of your life,
your pain would not seem
less wonderous than your joy;
And you would accept the seasons of your heart,
even as you have always accepted the
seasons that pass over your fields.
And you would watch with serenity
through the winters of your grief.

Much of your pain is self chosen.
It is the bitter potion by which the physician
within you heals your sick self.
Therefore trust the physician,
and drink his remedy in silence and tranquility:
For his hand, though heavy and hard,
is guided by the tender hand of the Unseen,
And the cup he brings, though it burn your lips,
has been fashioned of the clay
which the Potter has moistened
with His own sacred tears.

The Prophet, "On Pain"
Kahlil Gibran, 1965

I. THE STUDY PROBLEM

A. Introduction

The interest of this investigator in the pain associated with parturition developed throughout many years of observing laboring women during the twilight sleep of the mid 60's, the "awake and aware" movement of the late 60's, the Lamaze explosion of the 70's, and the "go with it naturally" trend of the early 80's. These many observations reinforced by personal experience in childbirth has led the author to the conclusion that for most women the experience of childbirth involves more than "discomfort". In fact, for most women childbirth involves pain in some quantity.

The existence of pain in the birth experience does not however negate the potential for a positive or enjoyment dimension in the experience. Relaxation and carefully reheersed control may exist simultaneously with intense pain and intense joy at the prospect of greeting a beloved child. There is, in the opinion of this investigator, no basis in fact for the spoken or unspoken tenet of many prepared childbirth enthusiasts that if a woman relaxes enough and concentrates on her breathing labor and birth will not be painful. Assisting women to deal with feelings of frustration, disappointment and guilt as the anticipated "hard work" of labor has given way to unexpected pain and exhaustion has caused this investigator to question not only the efficacy of prepared childbirth techniques as pain modifiers but also to question the depth of our theoretical understanding of the childbirth pain experience itself.

A review of pain literature by DeSouse and Wallace (1977) has concluded that, while pain serves an important biological function as a warning of actual or potential injury, its perception and interpretation is unique to the individual experiencing the pain. These authors identified early experience, attention, anxiety, reinforcement, and cultural heritage as

psychological factors and peripheral receptors, somatic sensory nerves, spinal cord involvement, and brain mechanisms as physiologic/anatomic factors which may influence the pain experience.

Labor pain is unique among pain experiences in that it is associated with a physiologic process, is usually predictably phasic, is time-limited, and is goal-directed. Kitzinger (1978) reported that women who are prepared for childbirth describe labor pain as "positive" or "functional pain", "pain with a purpose" or "creative pain". An analysis by Roberts (1983) identified age, social status, parity, race, and the reported prenatal attitudes of the wife, husband, or wife's mother toward childbirth as being unreliable predictors of distress from pain during labor. Critical factors which affect the degree of distress reported by women include not only the pain itself but also the feelings of helplessness and lack of control resulting from repeated, painful contractions (Roberts, 1983).

Although a variety of factors have been identified which may alter pain and its experience, current understanding of predictors and modifiers of labor pain remains unclear. Clinically, nurses interpret the behavior of parturients, instruct and support women in the use of relaxation and breathing techniques, and administer a variety of drugs from an incomplete understanding of the pain experience of labor. Nurses are the primary managers of the care of the parturient during labor and as such require a comprehensive framework of knowledge regarding labor pain based upon replicable research. As will be discussed in the literature review, a major difficulty in the research of labor pain has resulted from the lack of established validity and reliability in the measurement of the pain of parturition.

B. Statement of the Problem

What is the reliability and validity of instruments to measure pain during labor? Subproblems include:

1. What is the congruence of the postpartum self-report of labor pain with the self-report of pain obtained during labor?

2. What is the convergent and discriminate validity of instruments which assess features of the birth experience related to pain? Such features include anxiety, fear of pain, feelings of control, and birth enjoyment.

3. What are the effects of antecedent and intervening variables on the self-report of labor pain? Such variables include parity, childbirth preparation, analgesia/anesthesia, anxiety, fear of pain, feelings of control, and birth enjoyment.

4. What is the concurrent validity of the self-report of labor pain and physiologic parameters of labor progress and stress? Such parameters include cervical dilatation, frequency of uterine contractions, blood pressure, and heart rate.

C. Purposes of the study

The purposes of the study were to:

1. Determine if the postpartum recall of labor pain intensity and character accurately reflects pain intensity and character communicated during labor.

2. Determine the convergent and discriminate validity of instruments to measure labor pain, anxiety, fear of pain, feelings of control, and birth enjoyment.

3. Explore the effects of parity, childbirth preparation, analgesia/anesthesia, anxiety, fear of pain, feelings of control, and birth enjoyment on the self-report of pain experienced during labor.

4. Explore the relationships between pain self-report obtained during labor and the physiologic variables of cervical dilatation, frequency of uterine contractions, blood pressure, and heart rate.

D. Research Hypotheses

The following relationships are hypothesized:

1. Self-report postpartum pain intensity scores will not differ from self-report pain intensity scores obtained during labor.

2. Self-report postpartum pain character ratings will not differ from self-report pain character ratings obtained during labor.

3. Multiparous parturients will report less pain during labor than primiparous parturients.

4. Parturients prepared for childbirth through Lamaze (psychoprophylaxis) classes will report less pain during labor than unprepared parturients.

5. Anxiety will be positively associated with pain scores obtained during labor and postpartum.

6. Fear of pain will be positively associated with pain scores obtained during labor and postpartum.

7. Feelings of control will be negatively associated with pain scores obtained during labor and postpartum.

8. Enjoyment will be negatively associated with pain scores obtained during labor and postpartum.

9. The reliability of postpartum pain recall will not be affected by parity, childbirth preparation, analgesia/anesthesia, anxiety, fear of pain, feelings of control or birth enjoyment.

10. Cervical dilatation will be positively associated with self-report of pain during labor.

11. Increased frequency of uterine contractions will be positively associated with pain report during labor.

12. Mean arterial blood pressure will be positively associated with pain report during labor.

13. Heart rate will be positively associated with pain report during labor.

E. Need for the study

Since the meaningfulness and generalizability of any research findings are based partially on the validity and reliability of measures used in the investigation (Kerlinger, 1973; Nunnally, 1978; Polit & Hungler, 1983; Waltz et al., 1984), the measurement of labor pain needs to be studied in a controlled manner. Systematic comparisons of the results of studies investigating parturition pain are impeded by the lack of reliable measurement.

Labor pain has been primarily measured as a self-report, unidimensional concept defined by intensity and measured via a postpartum questionnaire or interview developed for use in a particular study (Beck et al., 1980; Brewin & Bradley, 1982; Cogan et al., 1976; Davenport-Slack & Boylan, 1974; Doering et al., 1980; Henneborn & Cogan, 1975; Klopfer et al., 1975; Klusman, 1978; Lennane, 1978; Nettelbladt et al., 1976; Norr et al., 1977; Scott-Heyes, 1982; Winsberg & Greenlick, 1967). This approach assumes that (a) intensity of pain is the most critical component of the distress resulting from pain during parturition and (b) postpartum recall is a reliable and valid reflection of the pain experienced during labor and birth. If these assumptions are true, the work of the researcher is greatly simplified in collecting and interpreting data relative to the pain experience of labor. If, however, these assumptions are not true, the measurement of labor pain must be redesigned in order that replicable answers to research questions can be found. At this point there is insufficient evidence to support the validity and/or reliability of a unidimensional, postpartum measurement of labor pain when investigating questions regarding the pain experience of parturition.

F. Definition of terms

1. Obstetrical features:

a. Parturition: the process of giving birth.

b. Parturient: a women in labor.

c. Spontaneous parturition: labor that is self-starting.

d. First stage of labor: from the onset of regular uterine contractions to full dilatation of the cervix. The first stage of labor may be divided into three phases:

1) Early Labor: 0 to 3 centimeters cervical dilatation.

2) Active Labor: 4 to 7 centimeters cervical dilatation.

3) Transitional Labor: 8 to 10 centimeters cervical dilatation.

e. Second stage of labor: from the end of the first stage of labor until expulsion of the infant is complete.

f. Third stage of labor: from the end of the second stage of labor until expulsion of the placenta is complete.

2. Antecedent variables:

a. Childbirth preparation: a series of four or more prenatal classes designed to help the parturient cope with labor through the use of techniques such as relaxation, controlled breathing, focused attention, or effleurage.

b. Parity: the condition of a women with respect to her having borne viable offspring.

3. Intervening variables:

a. Support: the constant attendance of one individual, significant other or professional, with the parturient throughout labor and delivery.

b. Anesthesia/analgesia: the use of any medicinal agent or technique for the elimination and/or relief of pain.

c. Cervical dilatation: the degree of opening of the internal os of the cervix as estimated in centimeters by a vaginal examination.

d. Frequency of contractions: the number of minutes elapsed from the onset of one uterine contraction to the onset of the subsequent uterine contraction.

4. Variables related to the labor experience:

a. Pain: an abstract concept which refers to a personal private sensation of hurt; a harmful stimulus which signals current or impending tissue damage; a pattern of impulses which operate to protect the organism from harm (Sternbach, 1968). Pain is whatever the experiencing person says it is and exists whenever she/he says it does (McCaffery, 1972).

b. Anxiety: worry or uneasiness about what may happen during labor and delivery as measured by the Self-evaluation in Labor Questionnaire (Lederman, E. et al., 1982, unpublished) and the Childbirth Experience Interview (Norr et al., 1977).

c. Control: the self-perceived ability of the parturient to handle labor as rated on the Self-evaluation in Labor Questionnaire and the Labor Agency Scale (Humenick & Bugen, 1981).

d. Enjoyment: feelings of satisfaction and pleasure experienced by the parturient during labor and delivery as rated on the Childbirth Experience Interview.

II. REVIEW OF LITERATURE

The review of the literature includes consideration of the major theories of pain, the physiology of labor pain, clinical investigations of labor pain, the measurement of labor pain, and the theoretical framework of pain perception.

A. Theories of Pain

From Aristotle's world of four centuries B.C. to the writing's of Marshall in 1894 affect pain theories prevaled. These theories were offered by philosophers and theologians who believed that pain had no physiologic similarity to sensation, but rather that pain was a feeling state, the normal opposite of pleasure. Aristotle defined pain as unpleasantness, the origin of which might be outside the body, within the body, or within the soul (DeSousa & Wallace, 1977; Kim, 1980; Wolf, 1980). The heart was thought by Aristotle to be the central source of pain, producing feelings of pain in response to waves of sensation transmitted along the blood vessels (Merskey and Spear, 1967). As reiterated by Marshall in the late nineteenth century,

> pleasure and pain can in no proper sense be classed with sensation. . . it appears to me neurologists are wasting valuable labor in the search for 'pain paths' and 'pain localization' in the cortex of the brain, the paths in the spinal cord and the supposed nerve terminals. . . pleasure and pain are two states which are too disparate to be commonly known by any one word, but so inseparably connected that they must be mentioned in one breath (Marshall,1894).

Developed out of the work of Erasmus Darwin, the late nineteenth century saw the rise of the intensive theory of pain which proposed that any excessive stimulation via the sensations of heat, touch, sight, taste, or smell would produce pain (DeSousa & Wallace, 1977). A popular theory among those who assumed that the only afferent pathways from the skin were the peripheral nerves of touch, heat, and cold, a neural mechanism in the spinal cord was proposed to offer two transmission paths for incoming stimuli. A low resistance

primary path could accomodate impulses of moderate intensity, while "excessive impulses" would overflow into the secondary pathway being transmitted upward to give rise to pain (Hardy et al., 1967). The intensive theory was further supported by the findings of Nafe (1934) in experiments with smooth muscle. Nafe identified the effects of extremes of heat or cold which produced painful, spastic contraction, while mere sensations of warmth or coolness, which were not unpleasant, existed between the two extremes. Scientific evidence that at least some pain has its own specific pathways led to the decline of this popular theory.

The intensive theory was soon replaced by the specificity theory in which pain was believed to result from transmission of pain impulses from specific tissue pain receptors via pain fibers to a pain center in the brain (DeSousa & Wallace, 1977; Kim 1980; Melzack & Wall, 1970; Weisenberg, 1977; Wolf, 1980). According to Melzack (1973), specificity theory originated in the thoughts of Descartes who suggested that the pain system was a straight through pathway from the skin to the brain, the so-called alarm bell theory. Supported by Müller's theory of specific nerve energies and the confirmatory work of Blix and Goldscheider identifying separate spots in the skin which responded to stimulation with their own specific quality (Dallenbach, 1939), specificity theory became, until quite recently, the theory taught in medical schools (DeSousa & Wallace, 1977). Additional evidence which strengthened the popularity of specificity theory included the deductions by Von Frey that free nerve endings branching out all over the body are the pain receptors; the experiments which showed that there is a one-to-one relationship between fiber size and quality of experience; and the identification of the key role of the spinothalamic tract for pain sensation (Melzack, 1973). Despite its supporting evidence, this simplistic theory is no longer considered valid due to its failure to account for the apparent physiological and anatomical complexities as well as the psychological influences on pain perception and response.

More recently, proponents of pattern theories of pain suggest that the critical determinants of pain are stimulus intensity and central summation. Pain is not therefore a specific stimulus but a perceptual response resulting from the summation of a spatial and temporal pattern of input (Kim, 1980; Melzack, 1973; Melzack & Wall, 1970; Weisenberg, 1977; Wolf, 1980). Although pattern theories of pain have contributed much to the understanding of pathologic pain, they also have failed to account for the psychological dimensions of pain.

Believing that the previous theories made important contributions to the understanding of pain yet failed to formulate a satisfactory general theory of pain, Melzack and Wall (1965) proposed the gate-control theory of pain (see Figure 1). The basic proposition of the theory was that "a neural mechanism in the dorsal horns of the spinal cord acts like a gate which can increase or decrease the flow of nerve impulses from peripheral fibers to the central nervous system" (Melzack, 1973, p. 153).

Located in the substantia gelatinosa, the gating mechanism was proposed to exert presynaptic or postsynaptic inhibition or excitation by responding to the ongoing neural activity preceding a specific stimulus, to the specific stimulus-evoked activity, and to the relative balance of activity in large diameter fibers versus small diameter fibers. Descending cortical control of the spinal gating mechanism was theorized to be exerted via the dorsal-column-medial-lemniscal and dorsal-lateral systems.

Finally, Melzack and Wall (1965) proposed that the action system, responsible for pain experience and response, is triggered when the integrated firing level of the dorsal horn T cells reaches or exceeds a critical level. Three categories of activity via the neospinothalamic tract, the reticular and limbic structures, and the neocortical processes interact to provide the perceptual information, motivational tendency, and cognitive information that constitute the experience of pain (Melzack, 1973).

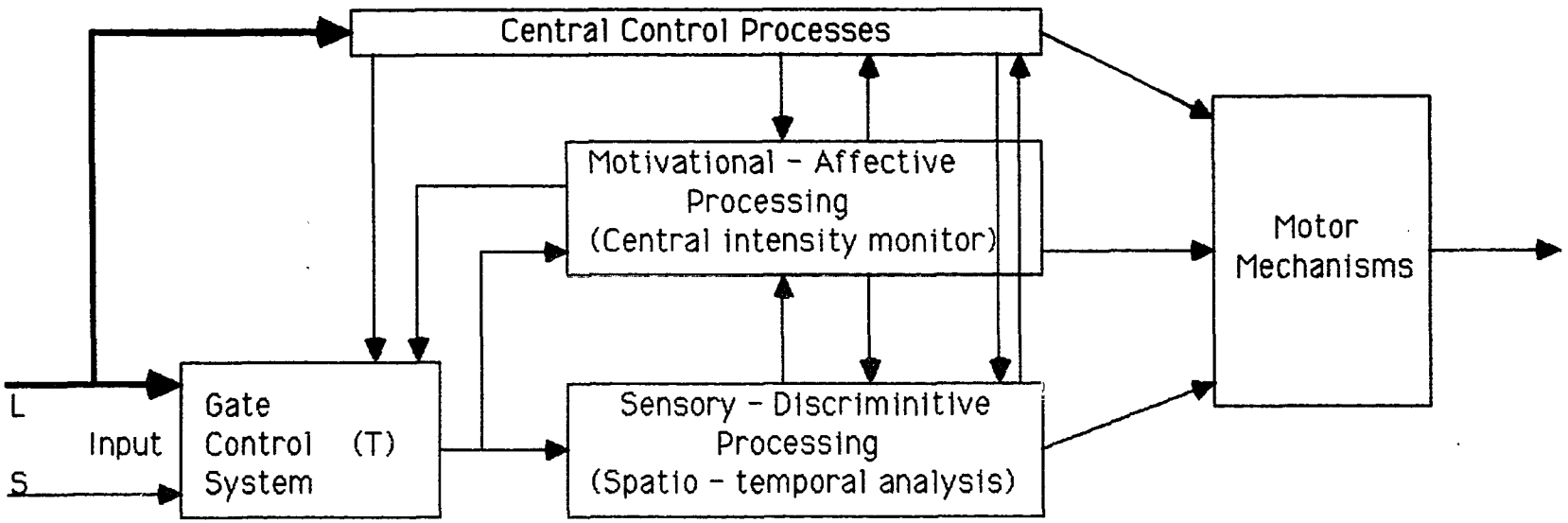

Figure 1. Conceptual model of the gate control theory of pain. The model notes the sensory, motivational, and central control determinants. The output of the transmission (T) cells of the gate control system projects to the sensory-discriminative and the motivational-affective systems. The central control trigger is represented by a line running from the large (L) fiber system to central control processes; these, in turn, project back to the gate control system and to the sensory-discriminative and motivational-affective systems. All three systems interact with one another, and project to the motor system.
Note. From Pain Measurement and Assessment by R. Melzack, 1983. New York, Raven Press. Copyright 1983 by Raven Press Books, Ltd. Reprinted by permission.

As with theories in any discipline, the gate-control theory has not been without its critics. Objections leveled against the theory have been the lack of histological evidence for presynaptic control of the afferent terminals in the substantia gelatinosa; the simplistic schema proposed for the temporal relations, fiber origins, and fiber recipients of the input of posterior root fibers; neglect of the stimulus-specificity of peripheral nerve fibers; neglect of the stratification hypothesis of pain which describes the different kinds of pain due to stimulation of different tissues and different layers of tissue; lack of evidence of the suppression of A delta and C fiber activity due to activation of larger myelinated fibers; and basing the theory on electrical stimulation and recording studies rather than on specific investigations of the response to noxious stimuli (Dykes, 1975; Nathan, 1976; Zimmerman, 1979).

> The gate-control theory has been revised with its basic tenets restated as follows:
>
> 1. Information about the presence of injury is transmitted to the central nervous system by peripheral nerves. Certain small diameter fibers (A delta and C) respond only to injury while others with lower thresholds increase their discharge frequency if the stimulus reaches noxious levels. 2. Cells in the spinal cord or fifth nerve nucleus which are excited by these injury signals are also facilitated or inhibited by other peripheral nerve fibers which carry information about innocuous events. 3. Descending control systems originating in the brain modulate the excitability of cells which transmit information about injury. Therefore, the brain receives messages about injury by way of a gate-controlled system which is influenced by 1) injury signals, 2) other types of afferent impulse and 3) descending control (Wall, 1978, p. 3).

B. Physiology of Labor Pain

Dick-Read (1944, 1954) described the uterus as possessing only two types of nociceptors activated respectively by laceration and excessive tension. Since normal labor does not include uterine laceration, Dick-Read concluded that "the pain of labour is almost entirely due to excessive tension" (1954, p. 592). Tension greater than the physiologic norm was proposed to be caused by sympathetic input to circular fibers of the lower uterine segment and cervix producing inappropriate contraction and resistance to the forces exerted

by the longitudinal fibers during uterine contractions. With contraction of the circular and longitudinal fibers effectively opposing each other, tension, pain, and exhaustion result. Dick-Read further postulated that the source of inappropriate sympathetic input to the circular fibers was fear, stating that "the pain of normal childbirth is almost negligible in the absence of fear" (1954, p. 593). The "fear-tension-pain" syndrome as described by Dick-Read has been a major factor in the development and spread of prepared childbirth techniques.

More recent evidence indicates that since the cervix is composed mostly of connective tissue with very little muscle and elastic tissue, cervical contraction stimulated by fear-induced sympathetic input cannot be supported as the major explanation for parturition pain (Bonica, 1979). During the first stage of labor nociceptive stimuli from the uterus, cervix, adnexa, and pelvic ligaments are transmitted via sympathetic fibers through the inferior hypogastric plexus. These fibers continue along the iliac vessels as the right and left hypogastric nerves communicating with the superior hypogastric plexus at the bifurcation of the aorta (Abouleish, 1977). Although a few nociceptive uterine afferents are also carried via the ovarian nerves, all of these fibers finally terminate in the posterior nerve root ganglia of the spinal cord.

Pelvic structures surrounding the vaginal vault may be a source of nociceptive stimuli during the late first stage and early second stage of labor. These fibers are components of visceral and somatic nerves that enter the spinal cord via levels T10 through S5 (see Figure 2). The second stage of labor is, however, dominated by nociceptive stimuli arising from distention of the perineal structures. These stimuli are passed primarily by the pudendal nerves through the sacral plexus to the posterior nerve root ganglia at levels S2 through S4.

Bonica (1979; 1980a; 1980b) and Abouleish (1977) describe three primary mechanisms which give rise to parturition pain: (a) dilatation of the cervix, (b) contraction and distention of the corpus and lower uterine segment, and (c) distention of the outlet, vulva,

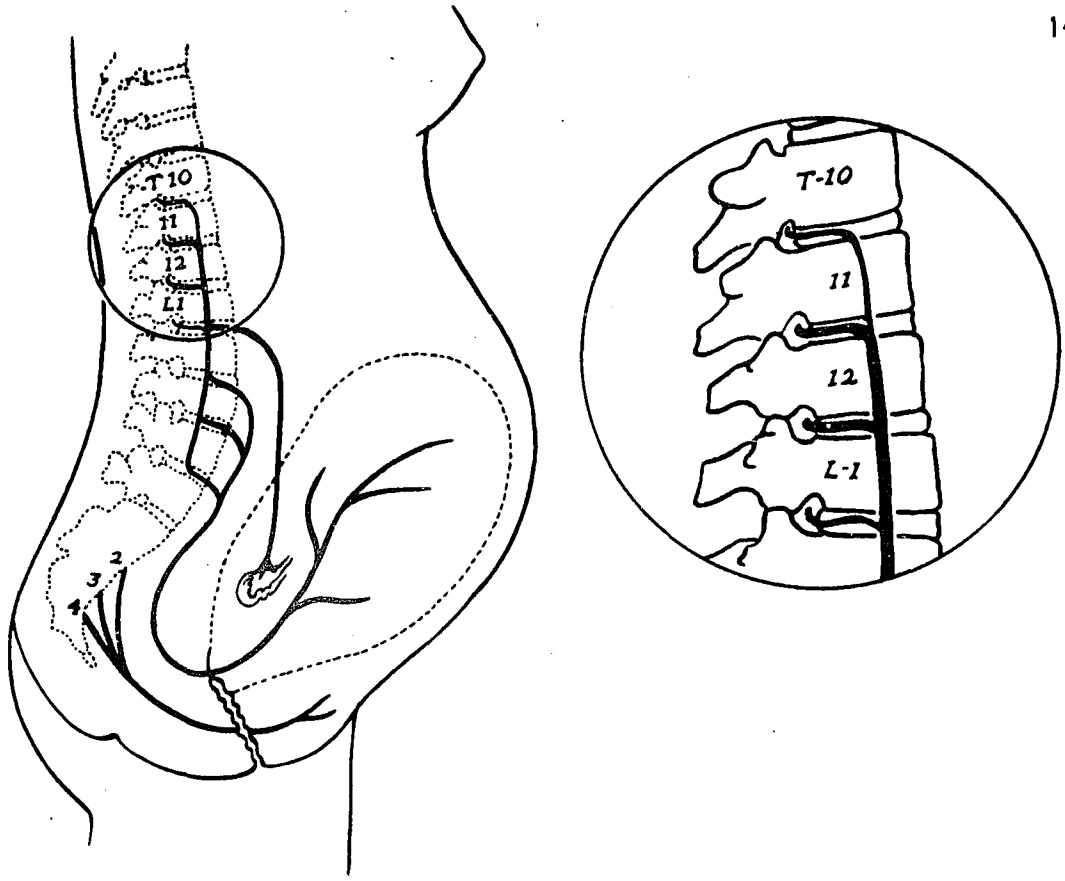

Figure 2. Peripheral parturition pain pathways. The uterus, including the cervix, is supplied by sensory (pain) fibers which pass to the spinal cord by accompanying sympathetic nerves in the following structures: the uterine, cervical and pelvic plexuses, the hypogastric nerve, the superior hypogastric plexus, the lumbar and lower thoracic sympathetic chain, and thence through white rami communicantes and posterior roots. The primary pathways (shown as thick lines in the inset) enter the 11th and 12th spinal segments, while the secondary auxiliary pathways enter at T10 and L1. The pathways from the perineum reach the sacral spinal cord via the pudendal nerves.

Note. From Obstetric Analgesia and Anesthesia, 2nd Ed. (p. 45) by J. J. Bonica, 1980, Seattle, WA: World Federation of Societies of Anaesthesiologists. Copyright 1980 by the World Federation of Societies of Anaesthesiologists. Reprinted by permission.

and perineum. In addition, Bonica has identified a number of other factors which may contribute to nociceptive stimuli during parturition such as traction and pressure on the adnexa and parietal peritoneum; pressure on and stretch of the bladder, urethra, and rectum; pressure on one or more roots of the lumbosacral plexus; and reflex skeletal muscle spasm in structures supplied by the same spinal cord segments as supply the uterus and cervix.

Uterine and cervical nociception is believed to be perceived by the activation of free nerve endings of subsets of A delta and C fibers. High-threshold mechanoreceptors and chemoreceptors are postulated to be the primary nociceptors responsible for the noxious stimuli of parturition. High-threshold mechanoreceptors are stimulated by intense pressure that may be the result of uterine contraction. Bonica (1980) has suggested that the increasing intensity of perceived pain commonly observed with the progression of labor may be due in part to a lowered threshold in the mechanoreceptors produced by the repeated stimulation of uterine contractions. A number of substances released by cellular breakdown during uterine contractions may lead to chemoreceptor stimulation. These liberated "pain-producing substances" may be bradykinin, histamine, serotonin, acetylcholine, and/or potassium ions.

After entering the spinal cord from the posterior root ganglia, the A delta and C fibers branch as Lissauer's tract to finally synapse on neurons in the marginal zone (Lamina I), substantia gelatinosa (Lamina II and III), and the deeper Lamina V of the dorsal horn (see Figure 3). From the large neurons of the marginal zone, axons pass to the contralateral side to form the spinothalamic tract. Axons from the neurons of the substantia gelatinosa simply project deeper into Lamina V of the dorsal horn. The convergence of cutaneous and visceral afferents on neurons in Lamina V constitutes the neural basis for the extensive referred pain common to parturition. Ascending fibers from Lamina V contribute to the paleospinothalamic and spinoreticular components of the anterolateral system. Nociceptive stimuli may be

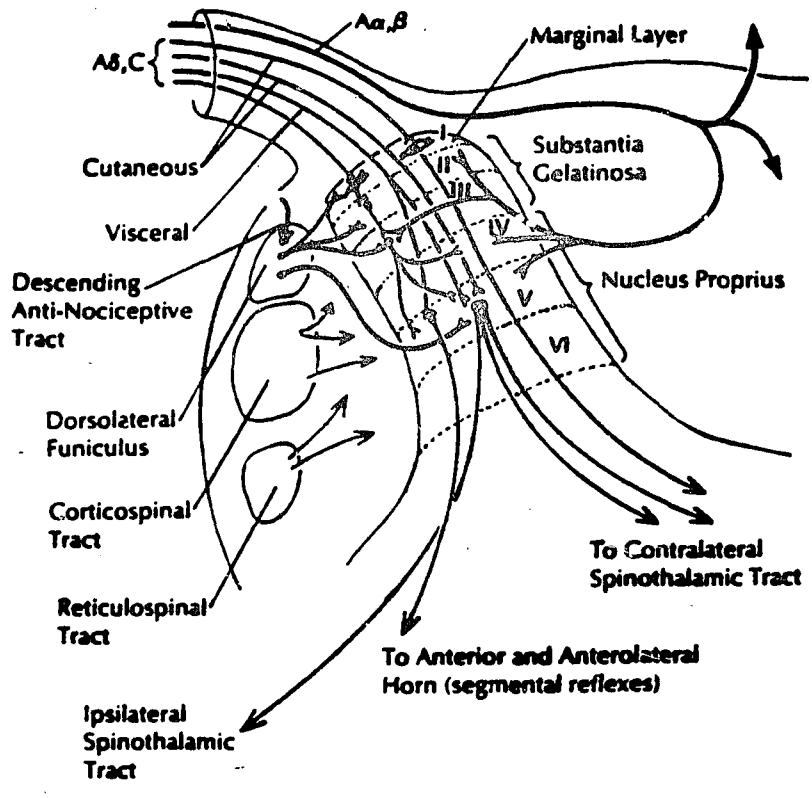

Figure 3. Nociceptive pathways in the dorsal horn. The large and medium-sized A-alpha and beta afferent fibers are concerned with proprioception, touch and pressure. They make up the dorsal column. A-alpha and gamma efferent fibers control reflexes and skeletal muscle function. Most of the small, thinly myelinated A-delta and unmyelinated C fibers transmit innocuous mechanical and thermal impulses, but many also transmit nociceptive impulses. This figure shows the disposition of these and other fibers in detail. The small A-delta and C fibers synapse in various laminae in the dorsal horn. Some are exclusively nociceptive and synapse in lamina I. A-delta and C fibers have a wide range of input, transmitting both innocuous and nociceptive impulses. They synapse primarily with cells in lamina V, but also in laminae IV and VI. The convergence of cutaneous and visceral fibers on the cells of lamina V are probably the neural basis for referred pain. Laminae I and V cells, and probably IV and VI cells, send most of the axons to the contralateral spinothalamic tract, although some ascend ipsilaterally.

Note. From Obstetric Analgesia and Anesthesia, 2nd Ed. (p. 49) by J.J. Bonica, 1980, Seattle, WA: World Federation of Societies of Anaesthesiologists. Copyright 1980 by the World Federation of Societies of Anaesthesiologists. Reprinted by permission.

inhibited in Laminae I, II, or V by descending fibers from the dorsolateral funiculus. This inhibition may be due to presynaptic control exerted by interneurons containing enkephalin.

C. Clinical investigations of labor pain

Labor pain has been a variable of interest in a number of clinical studies investigating the phenomena concerned with the process of parturition. One of the earliest reports studied the intensity of labor pain as measured by dolorimetry producing 55 comparative measurements made on 13 unmedicated women during the various stages of labor (Hardy & Javert, 1949). The findings of this study indicated that the intensity of pain during the first stage of labor was roughly proportional to the extent of cervical dilatation; the most intense pain was experienced by the women during the second stage of labor; the percentage of contraction time during which pain was experienced increased from 15% to 95% from early to second stage labor; the pain threshold of the subjects remained within the normal range; and the intensity of the parturient's pain could not always be evaluated by her behavior or apparent distress. Although the majority of these findings, such as the positive association between increasing cervical dilatation and higher levels of pain (Guiffre, 1983; Melzack et al., 1984; Roberts et al., 1981), have been supported by the investigations of other researchers, more recent studies indicate that for most women parturition pain peaks just prior to the onset of the second stage of labor during transition (Cogan, 1974; Klopfer et al., 1975; St. Van Eps, 1955).

A number of studies have found that childbirth preparation classes lead to significantly lower pain ratings by prepared women when compared to the ratings of unprepared women. In a sample of 250 primiparas, Bergström-Walan (1963) found that women trained by the Read method reported less pain for both the dilatation and expulsion stages of labor than untrained women. Similarly, preparation in the psychoprophylactic method (PPM) has been reported to result in lower pain ratings by a number of investigators

(Beck et al., 1980; Hommel, 1972; Norr, et al., 1977; Melzack et al., 1981). Prepared women have also been found to require significantly less analgesia/anesthesia during labor and delivery which has been interpreted to indicate decreased pain levels (Doering & Entwisle, 1975; Doering et al., 1980; Enkin et al., 1972; Fischer et al., 1972; Huttel et al., 1972; Scott & Rose, 1976; Zax et al., 1975). These studies do not indicate that parturition is without pain for prepared women, but rather that, on the average, the pain experienced by prepared women is self-evaluated as being less intense than that experienced by unprepared women.

Although the majority of data support the conclusion that childbirth preparation leads to significantly reduced pain scores, studies by Astbury (1980); Nettelbladt, Fagerström, and Uddenberg (1976); and Niven and Gijsbers (1984) have not supported the existence of such an effect. The first two studies of 90 and 112 primiparous women respectively found no significant differences in pain reported by trained and untrained women. Additionally, the investigation of 14 primiparous and 15 multiparous women by Niven and Gijsbers (1984) also showed no significant relationship between preparation for childbirth and pain during labor.

State anxiety during labor has been found to be positively related to the severity of labor pain (Astbury, 1980; Beck et al., 1980; Giuffre, 1983; Nettelbladt et al., 1976). Regression analysis by Beck et al. revealed that labor state anxiety combined with prenatal attitudes toward pregnancy and delivery accounted for virtually 100% of the variance in pain ratings by a group of 67 trained women. This auspicous finding is supported by Uddenberg's (1979) investigation into the psychological aspects of childbirth pain which found a significant correlation between a relatively negative reaction to the first realization of pregnancy and a description of the subsequent delivery as highly painful. Although increased general anxiety prior to labor has been associated with increased pain during labor (Klusman, 1978), subsequent studies have not identified a similar relationship between prenatal state

anxiety and reported discomfort during labor (Brewin & Bradley, 1982; Scott-Heyes, 1982). Differences in operationalization of the concept of anxiety in these studies may account for the discrepancies in the findings.

Antecedent variables which have been identified as having a negative influence on parturition pain include low socioeconomic status (Beck et al., 1980; Melzack et al., 1981), first pregnancy (Cogan, 1974; Melzack et al., 1981; Niven & Gijsbers, 1984; Norr et al., 1977; Winsberg & Greenlick, 1967), negative reaction to pregnancy (Nettelbladt et al.,1976), expectation of severe pain (Morgan et al., 1982; Nettelbladt et al., 1976), no previous pain experience (Niven & Gijsbers, 1984), and poor mental health during pregnancy (Nettelbladt et al., 1976). In contrast to these reports, no significant correlations were found in a study of 75 women by Davenport-Slack and Boylan (1974) between a woman's self-report of childbirth pain and prenatal training, age, gravida, education, menstrual pain, sexual desire, childbirth attitude, wanting husband present or medication expectation. These investigators suggested that "childbirth pain, based on self-report, is relatively uniform and invariant among women" (p. 220).

Reported satisfaction and/or enjoyment of the birth experience have been positively associated with lower levels of reported pain (Doering et al., 1980; Norr et al., 1977). High pain does not however necessarily lead to dissatisfaction with the birth experience. Some women report both high pain and high satisfaction or enjoyment (Morgan et al., 1982; Norr et al., 1977). Remaining in control or the ability to cope with labor has appeared as a primary variable in the link between pain and enjoyment. Women who are able to cope with labor in the sense of retaining self-control over their behavior are able to experience high satisfaction or a positive birth experience while reporting high pain (Doering & Entwisle, 1975; Doering et al., 1980; Morgan et al., 1982; Willmuth, 1975).

Significant positive correlations were found in a study by Scott-Palmer and Skevington (1981) between increased pain and decreased length of labor and high internal

locus of control suggesting that the duration of a painful bodily experience may be cognitively mediated by beliefs about controllability. In contrast, a subsequent study found that women who perceived that either they themselves or the staff exercised greater control over labor reported less pain than women who perceived labor to be less controllable (Brewin & Bradley, 1982). The apparent conflict between the results of these two studies may be due to the fact that specific feelings of control over the process of childbirth may not be reflected in the general measure of locus of control. It seems reasonable to suggest that women who believe that labor is in some aspect controllable by either themselves or the staff may perceive a decreased level of pain than women who believe that neither themselves or the staff are able to exert any control over labor.

In a study of the pain experienced by 141 women during labor using the McGill Pain Questionnaire, labor pain ranked among the severest forms of pain that had been recorded with this tool (Melzack et al., 1981). The primary predictors of parturition pain in this study were prepared childbirth training, menstrual difficulties and socioeconomic status for primiparas; and socioeconomic status and menstrual difficulties for multiparas. Although prepared childbirth training resulted in significantly lower total pain scores for primiparous women, no parallel effect was found in the pain scores of multiparous women. A susequent report suggested that frequency of uterine contractions, degree of cervical dilatation, maternal weight per unit of height, and fetal weight are the major physical variables which modify the severity of labor pain (Melzack et al., 1984). A significant contribution of these studies to the understanding of childbirth pain is the descriptive data relative to the qualities of labor pain reported by the subjects. Descriptors chosen by over 50% of the women for their pain during labor included sharp, cramping, and intense, while over 30% described their pain as tiring or exhausting.

The studies reviewed indicate that a multiplicity of antecendent and intervening, psychological and physical variables mediate the pain experience of parturition. Although

little data have been forthcoming to identify the qualitative nature of labor pain, it is evident that labor pain is a highly individual phenomena whose relation to the total birth experience represents a multivariate complexity. A predictive model for parturition pain is clearly not yet supported by a replicable body of research findings. Even when comparisons are made between investigations using only in-labor measurement of pain or only retrospective self-report of pain, few consisten relationships are identified.

As noted by Beck and Hall (1978), research in the field of natural childbirth has been plagued by a number of methodologic frailities including a failure to provide detailed descriptions of experimental procedures and treatment techniques; a lack of randomization, or matching when randomization is not feasible; observer bias in the rating of behavioral phenomena; the lack of attention-placebo controls; poor utilization of statistical methods; the failure to utilize multiple criteria to evaluate treatment effects; and poor measurement choices. These same difficulties frequently apply to the whole of childbirth research. Of particular concern to this investigator are the problems of measurement which provide the underpinnings of any investigation.

D. Measurement of Labor Pain

The pain experienced during childbirth has been operationally defined by four general methods. The studies of labor pain are summarized in Table I by type of pain measurement. The earliest method was an attempt to quantify the pain of labor by the dolorimeter (Hardy-Wolff-Goodell pain apparatus). Utilizing a cutaneous thermal electrode, laboring women were asked to equate the degree of thermal stimulus needed to duplicate the intensity of pain felt during the preceding uterine contraction (Hardy & Javert, 1949; Javert & Hardy, 1950). The actual intensity of pain was interpolated into dol units from a scale of the measured millicalories of the thermal stimulus. The pain of labor ranged from one dol in early labor to 10 1/2 dols during the bearing down of second stage. Although theoretically attractive as a matching stimulus which provided quantifiable data of pain intensity, this technique presented

TABLE I

SUMMARY OF CLINICAL STUDIES OF PARTURITION PAIN

Investigators	Specific measurement	Design	N	Variables	Results
			Dolimetery		
Hardy & Javert (1948) Javert & Hardy (1950)	Hardy-Wolff-Goodell Pain Apparatus	Descriptive	13	Pain, cervical dilatation, contraction interval and duration	Intensity of first stage pain roughly proportional to cervical dilatation. Pain threshold remained normal through labor. Most intense pain experienced during second stage. Duration of pain increased from 15% of contraction time during early labor to 95% of contraction time during second stage.
			Retrospective participant observer		
Winsberg & Greenlick (1967)	5 point ordinal scale by attending M.D. & R.N. and subject (during immediate postpartum period)	Descriptive, convenience sample of black & white obstetrical patients	365	Race, pain	No differences in pain reported by black and white women. Mothers rated their pain as more severe than it was rated by staff members.
Hommel (1971)	6 point ordinal scale by attending montrice (time after delivery unclear)	Retrospective, descriptive	1150	Psychoprophylaxis pain and difficulty in labor	One third report painless childbirth. Only 5% report pain greater than tolerable. 8% accept analgesics or anesthetics recommended by M.D.

TABLE I (continued)

SUMMARY OF CLINICAL STUDIES OF PARTURITION PAIN

Investigators	Specific measurement	Design	N	Variables	Results
		Retrospective participant observer (continued)			
Brown et al., (1972)	3 point ordinal scale of reaction to pain assigned by attending M.D. (time after delivery unclear)	Non-experimental prospective	64	Prenatal & perinatal psychological variables, sedatives/ analgesics, oxytocin.	Prenatal pregnancy adaptation negatively related with sedative & analgesic administration in labor. No relationships between amount of drugs, state anxiety, or reaction to pain.
Cogan (1974)	6 point ordinal scale by attending M.D., childbirth educator, husband, and subject (time after delivery unclear)	Descriptive, 2 groups convenience sample	32	Prepared childbirth, parity, pain	Less pain reported by multiparas than primiparas. Maximum pain reported during transition. Pain increased throughout the first stage of labor. Pain reports by educators, husbands, or M.D.'s were not consistent with the pain reports of the subjects.
Klopfer et al. (1975)	6 point ordinal scale by attending M.D., childbirth educator, husband, and subject (time after delivery unclear)	Retrospective, correlational, 5 groups identified by presence or absence of episiotomy, forceps & medication	106	Pain, episiotomy, forceps, medication	Pain experienced during second stage was not affected by the presence or absence of medication, episiotomies or forceps. Use of medication in second stage was not associated with any decrease in pain.

TABLE I (continued)

SUMMARY OF CLINICAL STUDIES OF PARTURITION PAIN

Investigators	Specific measurement	Design	N	Variables	Results
		Retrospective participant observer (continued)			
Cogan et al. (1976)	6 point ordinal scale by attending M.D., childbirth educator, husband, and subject (time after delivery unclear)	Non-experimental, prospective	936	Prenatal attitudes and experiences, childbirth preparation, birth experiences, pain.	Wife's pain report related to her confidence in her preparation and to the support of her husband. Many variables basic to childbirth preparation did not contribute to the prediction of pain. Reports of others are not like the wife's report.
Beck et al. (1980)	10 point ordinal scale by attending M.D. & R.N. and subject (within 24 hours postpartum)	Quasi-experimental (PPM vs PPM with systematic desensitization, self-selected control group)	102	Pregnancy-related attitudinal sets, anxiety,labor pain, manageability, postpartum depression, selected obstetrical variables	No variables tested were significant predictors of pain and manageability ratings by M.D. or R.N. Class participation predictive of pain ratings by S's. Pre-treatment attitudinal sets predictive of pain. Variance in pain accounted virtually 100% by labor state anxiety & pregnancy attitudes.
		Postpartum interview			
Davenport-Slack & Boylan (1974)	15 word adjective list & a 5 point ordinal scale plus experiential testimony (within 18 hours postpartum)	Prospective, correlational	75	Eleven psychosocial predictor variables; six childbirth outcome criterion variables.	None of the eleven predictor variables contributed significantly to the variance of pain.

TABLE I (continued)

SUMMARY OF CLINICAL STUDIES OF PARTURITION PAIN

Investigators	Specific measurement	Design	N	Variables	Results
		Postpartum interview (continued)			
Nettelbladt el al. (1976)	3 point ordinal scale (intolerable, severe or moderate) from interview item (one to two days postpartum)	Prospective, correlational of a randomly selected primiparous sample	78	Social and psychological variables, childbirth pain, mental health	High pain related to poor education, negative reaction to pregnancy, prenatal anxiety concerning the pain of childbirth,low interest in childcare, not wanting another pregnancy, use of insecure contraception, increased anxiety during labor.
Norr et al. (1977)	Pain index computed from eight interview items (one to three days postpartum)	Retrospective, correlational with causal modeling	249	Background characteristics, pregnancy experience, labor setting, labor process, medication, pain and enjoyment.	High negative correlation between pain and enjoyment. Postulated model explained enjoyment better than pain. Positive self-concept, PPM, and labor analgesia have significant regression coefficients with pain.
Charles et al. (1978)	20 point pain scale based on responses to a series of interview questions (one to three days postpartum)	Retrospective, correlational	249	Childbirth preparation, obstetric features, pain, enjoyment, parity.	No obstetrical differences for prepared women, except for a lower use of delivery anesthesia. Psychoprophylaxis related to lower levels of pain, greater control of pain, and increased birth enjoyment.

TABLE I (continued)

SUMMARY OF CLINICAL STUDIES OF PARTURITION PAIN

Investigators	Specific measurement	Design	N	Variables	Results
		Postpartum interview (continued)			
Uddenburg (1979)	Unclear from semi-structured interview (within two days postpartum)	Prospective, descriptive of a randomly selected primiparous sample	85	Pain as related to biological, psychological and social factors	Negative initial reaction to pregnancy, poor contraceptive technique, poor education, negative reaction to having another child, prenatal anticipation of pain, poor mental health during preganancy, and poor social support during labor associated with highly painful delivery.
Doering et al. (1980)	Extracted from a number of interview items (within 2 months postpartum)	Prospective, correlational with recursive modeling	120	Preparation level, husband's participation, pain, level of awareness, quality of birth experience	Preparation leads to increased awareness at birth. Pain has a negative effect on birth enjoyment. Preparation improves the quality of the birth experience by improving social support and behavioral control. Neither preparation nor husband participation exert any substantial effects on pain.
		Postpartum ordinal scale			
Bergström-Walan (1963)	3 point ordinal scale of intensity for first and second stages (one to two hours postpartum)	Quasi-experimental, prospective (Primiparas randomly selected for childbirth training)	250	Childbirth preparation, pain & anxiety, number of other obstetrical & psychosocial variables	Prepared women were calmer & experienced less pain during labor and delivery, used less sedatives, and had shorter labors. Preparation benefited women regardless of education. Preparation efficacy greatest for women of lower education levels.

TABLE I (continued)

SUMMARY OF CLINICAL STUDIES OF PARTURITION PAIN

Investigators	Specific measurement	Design	N	Variables	Results
		Postpartum ordinal scale (continued)			
Henneborn & Cogan (1975)	6 point ordinal scale suggested by discussion (time after delivery unclear, mailed response)	Prospective, correlational	49	Husband participation in labor & birth, pain, medication, prenatal birth attitudes	Women whose husbands participated in labor & delivery prenatally indicated a desire to increase emotional participation, reported less pain & received less medication at all labor stages.
Klusman (1975)	7 point ordinal scale of overall pain and specifically for transition (time after delivery unclear, mailed response)	Prospective, correlational (primigravidas from Lamaze & Red Cross prenatal classes	42	Prenatal anxiety, fears for self, fears for baby, irritability & tension; pain during labor & delivery, anesthesia, complications of labor	Both Lamaze & Red Cross classes equally effective in reducing pregnancy related fears. Only Lamaze resulted in any reduction in anxiety. Anxiety and level of anesthesia had opposite effects on pain during transition.
Lennane (1978)	4 point ordinal scale, subject asked to note duration of pain at each level (three to five days postpartum)	Retrospective, descriptive	50	Pain, pain relief, type of analgesic/ anesthetic (pethidine, promazine, NO_2, epidural)	Pain of labor modified very little by analgesics/anesthetics used. The amount of time subjects reported being in severe or very severe pain was not affected by IV pitocin induction. Only epidural analgesia was effective in reducing severe or very severe pain.

TABLE I (continued)

SUMMARY OF CLINICAL STUDIES OF PARTURITION PAIN

Investigators	Specific measurement	Design	N	Variables	Results
		Postpartum ordinal scale (continued)			
Brewin & Bradley (1982)	5 point ordinal scale (first postpartum day)	Prospective, correlational	75	Childbirth preparation, expectation of control, anxiety, pain	Prepared women prenatally believed both they & the professional staff had greater control over birth process. Prepared women were not less anxious. Less pain reported by prepared women and those perceiving greater control by self or staff.
Bundsen et al. (1982)	5 point ordinal scale (within two hours postpartum)	Retrospective, correlational	514	Pain, pain relief, analgesic/ anesthesic, duration of labor, cervical dilatation, neonatal status	No correlation between antenatal preparation and pain intensity. Low pain & positive attitudes towards pain-less delivery without drugs positively correlated. 64% graded first stage pain as severe to almost unbearable. No pain differences between primips & multips. Pain predicted by admission dilatation.
Scott-Heyes (1982)	Not specified, ordinal scale implied by discussion (within one week postpartum)	Prospective, correlational	59	Prenatal anxiety, anticipation of birth, evaluation of birth, pain, medication, labor length, satis-faction, coping, postnatal anxiety	Anticipated & actual birth evaluation significantly correlated. Prenatal anxiety not related to any birth variables. Higher anxiety tended to be associated with more negative anticipations. Pain significantly negatively correlated with birth evaluation.

TABLE I (continued)

SUMMARY OF CLINICAL STUDIES OF PARTURITION PAIN

Investigators	Specific measurement	Design	N	Variables	Results
		Postpartum linear analogue			
Morgan et al. (1982)	10 cm. linear analogue, 0 'no pain at all' to 100 mm. 'as much pain as is possible to imagine' (within 48 hours postpartum)	Retrospective, descriptive	1000	Level of analgesia, pain, pain relief, length of time pain lasted	Epidural anesthesia resulted in the lowest average pain scores among 8 categories of analgesia/anesthesia. Duration of pain shortest among women who received epidural only. About one-third experienced more pain than they had expected.
		In-labor ordinal scale			
Astbury (1980)	4 point ordinal scale (post-treatment at one point during active labor)	Quasi-experimental (self-selected primiparas into prepared or no prep; randomly assigned to 3 labor treatments)	90	Preparation, birth attitudes & knowledge, in labor anxiety & pain, postnatal evaluation. Labor treatment with information or music.	No differences in pain, state or trait anxiety between prepared & unprepared women. No differences in pain or state anxiety between prepared & unprepared in relation to the labor treatments.
Roberts et al. (1981)	5 point ordinal scale 3 point nominal scale (every 30 minutes with postion change)	Experimental	30	Sitting or side position, uterine contractions, fatigue, location & intensity of pain	Increased pain with increased intensity of contractions & fatique as labor progressed irrespective of position. Women preferred to sit in a chair in early labor and lie on their side in bed in late labor (> 6cm).

TABLE I (continued)

SUMMARY OF CLINICAL STUDIES OF PARTURITION PAIN

Investigators	Specific measurement	Design	N	Variables	Results
		In-labor visual analogue scale			
Zimmermann-Tansella et al. (1979)	Pain thermometer divided into 100 units 'no pain at all' to 'pain unbearable' (measured hourly after vaginal exam)	Experimental (subjects randomly assigned to RAT or traditional PPM)	34	Anxiety, relaxation, obstetric risk, labor anxiety, pain, postnatal birth evaluation	Participants in Respiratory Autogenic Training tended to report less anxiety at onset of labor and decreased pain during labor. Labor evaluation did not differ between the two groups of trained women.
Scott-Palmer & Skevington (1981)	Bipolar VAS divided into 10 units, 'no pain at all' to 'intense pain' (pain measured hourly during labor)	Ex post facto, correlational (convenience sample 30 women in labor & 30 non-pregnant women)	60	Pain, locus of control, life events, neuroticism, extraversion, social desirability	Women with high external locus of control report less pain/hour of labor. Pain and controllability not related for menstrual reports. Longer labor associated with more external locus of control. High neuroticism assoc. with less pain.
Giuffre (1983)	10 cm. horizontal VAS, 'no pain' to 'pain as bad as it could be' (pain measured after each vaginal exam but not more often than every 30 minutes)	Ex post facto, correlational	76	State anxiety, pain, cervical dilatation	Strong positive correlation between pain & cervical dilatation. Increased pain associated with lack of childbirth preparation, decreased control during labor, decreased support during labor.

TABLE I (continued)

SUMMARY OF CLINICAL STUDIES OF PARTURITION PAIN

Investigators	Specific measurement	Design	N	Variables	Results
		In-labor McGill Pain Questionnaire			
Melzack et al. (1981)	MPQ (completed once by each woman at random times during labor)	Ex post facto, correlational	141	Pain, parity, childbirth preparation, variety of other psychosocial and labor related variables	Labor pain ranks among the most intense pain recorded with the MPQ. Main predictors of pain for primiparas childbirth preparation, menstrual difficulties and SES; for multiparas SES and menstrual difficulties. Preparation produced lower pain scores only for primiparas.
Niven & Gijsbers (1984)	MPQ (completed once during active labor, also completed 24-48 hours postpartum)	Ex post facto, correlational	29	Pain, previous pain experience, number of pscho-social and labor related variables	Previous pain experience associated with lower levels of pain. Primiparas experienced higher levels of pain as did women having longer labors. Preparation and analgesic medication did not affect pain.
Melzack et al. (1984)	MPQ (completed once by 141 subjects, twice or more by 79 subjects)	Ex post facto, correlational	240	Pain, contraction frequency, cervical dilatation, fetal weight, menstrual pain, height/ weight ratio, anesthesia.	Frequency of contractions, cervical dilatation, greater height/weight ratio associated with lower pain, menstrual difficulties associated with increased pain for both primiparas and multiparas Both Melzack studies confirm wide individual variation in labor pain.

serious methodolgic problems, not the least of which was the infliction of injury from the thermal electrode. In fact the stimulus needed to match the pain of labor at 10 1/2 dols was sufficient to inflict a third degree burn. No further reports utilizing this technique in the research of parturition pain appear in the literature.

A second operational approach to the measurement of the pain of parturition has been retrospective ratings assigned by participant observers such as nurses, midwives and physicians. The conclusion that one third of PPM prepared women have painless childbirth was based by Hommel (1972) on an ordinal evaluation of the method's effectiveness assigned by the woman's monitrice (nurse coach). This 1-6 scale graded the methods's effectiveness from Grade 1, exceptional, indicating there was no pain or difficulty at any point in labor or delivery, to Grade 6, failure, indicating that the women faired no better in labor than an unprepared woman. A study comparing the pain reponse in negro and white parturients used a post-delivery 1-5 ordinal scale of pain intensity completed by the patient as well as the attending nurse and physician (Winsberg & Greenlick, 1967). Similarly, a series of related reports used a 1-6 ordinal scale to measure parturition pain as rated by the woman, her husband, the attending physician, and the woman's childbirth educator (Cogan, 1974; Cogan et al., 1976; Klopfer et al., 1975). In a study examining the relationship of various psychological variables to the use of drugs in labor, Brown et al. (1972) used a 1-3 rating of the woman's reaction to pain as evaluated by the attending physician after delivery. A final study used a 10-point rating scale to describe parturition pain completed within 24 hours of delivery by attending obstetricians and nurses (Beck et al., 1980). This study also used a similar postpartum rating assigned by the woman during her hospitalization.

A number of difficulties are apparent in the use of retrospective participant observer pain ratings. The first problem is a communication issue since this measurement choice assumes (a) that the woman is able to communicate verbally and nonverbally the intensity of

her pain, and (b) that the participant observer is able to correctly perceive and interpret the woman's communication signals. Secondly, the use of a participant observer introduces the multifaceted confounding of observer bias. Not only may the observer be aware of the hypothesis under study, but the participant observer has a personal stake in the outcome of the labor and delivery process. Finally, retrospective ratings introduce the difficulties of recall with the potential for loss of accuracy and confusion of detail on a busy obstetrical service. Comparisons made by Cogan (1974) indicated that pain ratings assigned by any of three participant observers (childbirth educators, husbands, and physicians) were not consistent with and were significantly lower than the pain ratings assigned by the women themselves during the first stage of labor. Interestingly, fathers and physicians rated the pain of second stage as more severe than did the women. In the 1967 study by Winsberg and Greenlick of 365 parturients, the women uniformly evaluated their labor and delivery pain as more severe than did the attending physicians and nurses.

Retrospective self-report of pain is a third category of pain measurement that has appeared in the childbirth literature. Postpartum structured, semi-structured, and open-ended interviews provide data which have been frequently used to compute ordinal scales of pain intensity experienced during labor (Charles et al., 1978; Davenport-Slack & Boylan, 1974; Doering & Entwisle, 1975; Doering et al., 1980; Nettelbladt et al., 1976; Norr et al., 1977; Uddenberg, 1979). The evaluation of pain may be based upon the woman's reponse to one or two items eliciting a global description of her pain during labor or upon a combination of interview items which address the degree of distress experienced during diffferent phases of labor. It is at times difficult to determine from the published report the exact interview items upon which the measurement of pain is based.

A second type of retrospective self-report measurement is the ordinal pain scale on postpartum questionnaires (Bergström-Walan, 1963; Brewin & Bradley, 1982; Bundsen et al., 1982; Cogan, 1974; Henneborn & Cogan, 1975; Klusman, 1978; Lennane, 1978).

Degree of pain severity, represented by from three to seven levels with a variety of attached verbal descriptors, is assigned to all or parts of labor as the woman recalls the events on a questionnaire. The pain items are frequently part of a larger questionnaire designed to measure a variety of labor-related phenomena.

Retrospective self-report of labor pain has also been elicited through the use of a postpartum linear analogue (Morgan et al., 1982). As part of a study to investigate the effectiveness of pain relief in labor, women were presented a 10 centimeter linear analogue graded between 0 (no pain at all) and 100 millimeters (as much pain as is possible to imagine) and asked the question "How much pain did you experience?". Accompanying items to the analogue asked the women their feelings about the correctness of the amount of pain they experienced and the length of time their pain persisted.

The elapsed time from delivery at which retrospective self-reports of pain have been obtained ranges from two hours to three months. Questionnaires may be completed by the woman during the immediate post-delivery recovery period or mailed back to the investigator within days, weeks, or months of delivery. Although self-report must of necessity be accepted as a valid representation of a subjective experience, the retrospective aspect introduces a number of potentially confounding elements into the measurement process. The accuracy of recall as well as the stability of the construct itself must be considered.

Self-report during labor is the final category of measurement that has been utilized in the investigation of parturition pain. A four-point ordinal scale was used during labor to evaluate the effectiveness of information given during labor in reducing pain for both trained and untrained women (Astbury, 1980). Asked to rate the painfulness of their labor at a post-treatment time in active labor, the women responded on a scale ranging from ' not at all' to 'very much so'. Similarly, Roberts et al. (1981) asked women to report their level of discomfort on a five-point ordinal scale in response to changes in position every 30 minutes during labor.

Three studies have been identified which utilized a visual analogue scale (VAS) for the measurement of pain during labor. The amount of pain experienced during the preceeding uterine contraction was assessed hourly by a VAS in a study to evaluate the relative effectiveness of Respiratory Autogenic Training as compared to traditional psychoprophylaxis (Zimmermann-Tansella et al., 1979). The VAS used in this study was a pain thermometer ranging from 0 (no pain at all) to 100 (pain unbearable). A bipolar VAS divided into 10 units ranging from 0 (no pain at all) to 10 (intense pain) was also completed hourly by laboring women in a study by Scott-Palmer and Skevington (1981). In the third study, a 10 centimeter horizontal line labeled "no pain" on the left end and "pain as bad as it could be" on the right end was used as a VAS to measure pain in laboring women after each vaginal examination (Giuffre, 1983). After the woman marked the line at a point to represent the relative intensity of her pain, the pain score was derived by placing a key over the marked line which was divided into 20 half centimeter intervals. Possible scores with this VAS were 0 to 20.

Finally, three reports have recently appeared in which the McGill Pain Questionnaire was used to measure pain during labor (Melzack et al., 1981; Melzack et al., 1984; Niven & Gijsbers, 1984). The McGill Pain Questionnaire provides qualitative and quantitative assessment of pain through twenty-one sets of words describing the intensity, sensory, affective, and evaluative dimensions of pain. The reliability of this tool has been established as well as its ability to discriminate between different pain syndromes, including labor.

From this review of the measurement of parturition pain, the following issues have been identified:

1. There is a lack of valid and reliable instruments. There is little evidence of a directed effort by researchers in the field to systematically develop tools for the measurement of parturition pain and establish their validity and reliability.

2. The primary focus on intensity as the operational definition of parturition pain is incomplete. Although intensity is an undeniable facet of pain, intensity is treated as a unidimensional characteristic whose singular use prohibits exploration of the total pain experience as it relates to childbirth.

3. The majority of studies cited rely on postpartum self-report of parturition pain. No research has demonstrated the relative comparability of pain self-report obtained during labor to pain self-report elicited after birth. A variety of antecedent and intervening variables may affect this relationship.

The ultimate goal of research investigating parturition pain is to enhance the efforts of care providers in modifying the pain experience and assessing the effectiveness of interventions directed at pain reduction. It may be that one aspect of our inability to clearly establish the efficacy of intervention modalities such as childbirth education, relaxation training, breathing techniques, massage, or variations in maternal position is our lack of precision in measuring those facets of the pain experience of parturition amenable to these modalities.

E. Theoretical framework

In his extensive review of the pain literature, Beecher (1957) conceptualized pain as having two basic components, a primary phenomenon or afferent output from sensory receptors and a secondary phenomenon or processing and reaction. The primary phenomenon is of physiologic origin, results from stimulation and response of sensory receptors, and is presumably the same for a given stimulus in all normal individuals. According to Beecher, this primary phenomenon overlaps with and precipitates the secondary phenomenon when the afferent stimulus erupts into consciousness.

Perception or recognizing the sensation, processing, and reaction comprise the secondary or physic component of pain. Processing is believed by Beecher to begin before awareness or conscious perception is achieved. Factors influencing processing are the

concept, the significance, the importance, and the degree of seriousness attached to the sensation by the individual. Memory and judgment function to influence the meaning of the pain to the individual through past experience and present consideration. Finally, Beecher proposed that perception can be dominated by, even obliterated by, the reaction pattern of the individual as evidenced in the indifference to injury sustained during the excitment of games, combat, or sexual arousal; the absence of pain reaction resulting from suggestion, hypnosis, or catalepsy; and the apparent comfort of painless childbirth.

Since Beecher's review, numerous investigations have probed the various dimensions of pain in attempts to understand it, manipulate it, and measure it. Although in most instances pain has a physiologic stimulus-response basis, there are examples of pain for which no apparent peripheral stimuli can be demonstrated (Weisenberg, 1977). The origin or causality then of pain ranges from a neural response to actual or impending tissue damage to emotional and psychological factors impinging on the psyche to produce pain. Due to the detrimental effects of labeling the source of pain as "psychologic" versus "physiologic", Liebeskind and Paul (1977) have suggested that pain be distinguished as being of peripheral, central, or unknown origin.

Beyond the causality of pain is the cognitive/psychological milieu in which it is perceived. Although neural input may determine reflexive response to a noxious stimulus, affective response is a higher-order process involving multimodal integration of the entire set of sensory, reticular, limbic, and cortical input (Melzack, 1980). A primary influence on the integration of the pain response is the response set created by past experience with pain (Melzack, 1973; 1980; Melzack & Wall, 1970). For the pregnant woman this set may involve all prior pain experiences as well as prior labors or the surrogate experience of labor through the recountings of significant others. Negative past experience frequently precipitates fear and anxiety which can magnify the perception of and reaction to painful stimuli (Friedman, 1974; Murray, 1971). Conversely, past experience with pain may

enhance feelings of self-efficacy in the face of a new painful experience leading to reduced anxiety and pain perception (Manning & Wright, 1983; Niven & Gijsbers, 1984).

Cognition and response is also mediated through the meaning of a painful experience for an individual. The ability to identify the meaning of the pain is a significant force in determining the reaction of an individual and his/her ability to cope. Control, or the belief that one has at one's disposal a response that can influence the aversiveness of an event, operates as a central coping mechanism through behavioral control, cognitive control, and decisional control (Averill, 1973). Women have identified a primary benefit of prepared childbirth to be behavioral control which allowed them to cope with the discomfort of labor (Brewin & Bradley, 1982; Roberts, 1983; Willmuth, 1975).

Cognitive control of aversive stimuli has been described as the way a potentially harmful event in interpreted (Averill, 1973). Although the stress reducing effects of cognitive control are not totally clear, studies have indicated that information gathering and appraisal reduce the self-report of anxiety during the period of anticipation before a painful event and the self-report of pain after the event (Thompson, 1981). Cognitive control may be one mechanism by which self-report of parturition pain is reduced in prepared women.

The range of choice or number of options open to an individual determine the degree of decisional control the individual may exert over aversive events (Averill, 1973). A major charge of critics of maternity care in the United States has been the dehumanizing effects of traditional practices during which women are told how, when, where, and with whom they will deliver their babies. Stripped of all decisional control, parturients may experience unnecessarily enhanced pain perception.

Since pain is not merely a sensation but a complex phenomenon involving the totality of an individual's subjective inner self, a variety of sociocultural and psychologic variables have been studied for their effect upon pain perception. Jacox's (1977) review of such factors on pain threshold and pain tolerance concluded the following:

1. Age: Data are inconclusive, although more studies seem to indicate that pain threshold increases with age.

2. Sex: Pain threshold does not seem to vary between men and women. Pain tolerance seems to be greater in men than women.

3. Ethnic origin: There is no consensus that either pain threshold or tolerance is related to race. (No differences were found in the pain response or level of self-reported pain during labor between black and white lower class women in a 1967 study by Winsberg and Greenlick.)

4. Personality characteristics: Extraversion has not shown any consistent relationship with either pain threshold or pain tolerance. Neuroticism and anxiety are generally found to be associated with increased pain. Denial and repression are associated with decreased pain tolerance. Dependence, indicating either a perceptual style or response to social influence, seems to be associated with increased pain tolerance.

Beecher's conceptualization of pain has been substantiated in the pain literature with general agreement now existing that pain perception involves at least two basic components: a sensory component (pain sensation) and an emotional reaction component. These two components have also been labeled the sensory-discriminative and the motivational-affective dimensions by Melzack and Dennis (1978). The emotional reaction component has been further subdivided by some investigators into (a) pain experience, (b) pain behavior, and (c) physiologic responses to pain stimulation (Lethem et al., 1983). Thus pain is a multifaceted phenomenon, the precise characteristics of which are dependent upon the balance and interactions of its component parts.

A conceptual model(see Figure 4) proposed by Chapman (1977) captures for this investigator a graphic representation of this multidimensional abstraction called pain. This model identifies the centrality of the noxious sensory input to pain, locating that input with the interactive subjectivity of 'private experience'. Noxious sensory input is seen within the

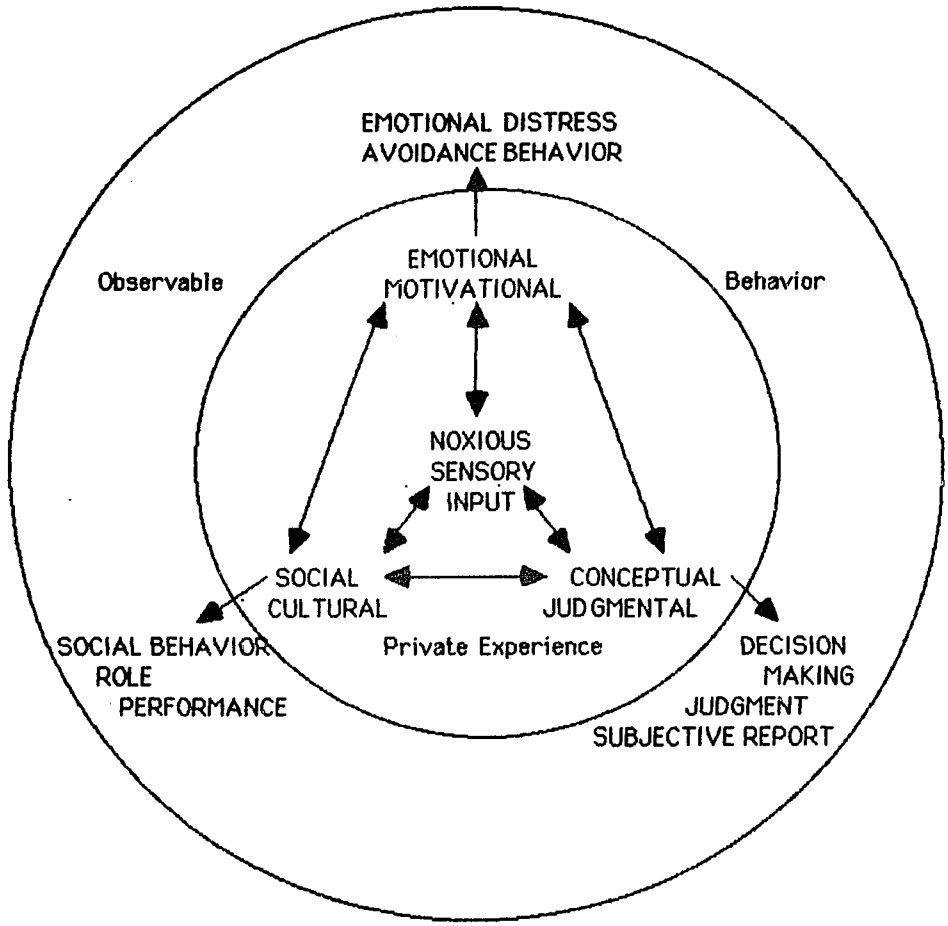

Figure 4. A model for the human pain experience. Note. From "Sensory decision theory methods in pain research: A reply to Rollman" by C.R. Chapman, 1977, Pain, 3, p. 302.

model to contribute to and be affected by social/cultural, conceptual/judgmental, and emotional/motivational influences. Access to the private experience of pain is only available to the researcher via inference from measures of observable behavior. As reflected in the model, subjective report, the most common method of pain measurement, primarily reflects the conceptual/judgmental processes of the internal reality of pain. The internal conceptual/judgmental processes are however affected by each of the other pain dimensions in a dynamic manner. As in any dynamic system, the magnitude of influence from a given component on the output of the system may vary depending upon the level of activity within the component at any given time. In other words, the "observable behavior" of subjective report reflects the integration of varying quantities of noxious sensory stimuli, social/cultural stimuli, and emotional/motivational stimuli impinging upon the dynamic conceptual/judgmental process. Verbal report is but one behavior from which we infer an internal state called pain.

During labor primary nociceptive sensory input originates in the uterus, cervix, pelvic and perineal structures. These sensory stimuli are processed and interpreted with the framework of social/cultural, emotional/motivational, and conceptual/judgmental influences. The literature has shown that self-report of pain, one of the observable behaviors of the private experience of pain, may be influenced in the parturient by socioeconomic status, self-concept, parity, reaction to pregnancy, menstrual difficulties, past experience with pain, mental health, childbirth preparation, feelings of control, feelings of helplessness, anxiety, dependence, and satisfaction or birth enjoyment. The self-report of labor pain may vary with time due to the dynamic influence of these plus other unidentified variables on the private experience of pain. The investigation of the reliability/validity of the self-report of labor pain and selected variables may :

1. Provide empirical evidence for the validity of postpartum pain self-report in labor research.

2. Lend additional insight into the complexities of the private experience of labor pain.

3. Suggest replicable methods for evaluation of the impact of nursing interventions on maternal pain during labor.

III. METHODOLOGY

This non-experimental, field study was designed to investigate the reliability and validity of the measurement of labor pain and the relationships between pain measurement and a number of selected antecedent and labor related phenomena. The variables included in this psychometric analysis are presented in Figure 5.

A. Research setting

The labor/delivery and postpartum units of a hospital in a suburb of a large midwestern city was the research site. This institution is a 279 bed acute care community hospital with Level II Perinatal Status. In 1985 there were 2721 obstetric deliveries at the hospital. The proposed study qualified for exempted review by the institution's Experimental Review Committee. The approval of the attending medical staff was obtained through the hospital's Department of Obstetrics. Additionally, explanatory letters with an abstract of the study proposal (Appendix A) were sent to each medical practice group or individual physician to elicit their cooperation with the study. All physicians reponded affirmatively to participation of their patients in the study.

The study hospital provides a family centered labor and delivery experience for all parturients. All subjects in the study were accompanied throughout labor and delivery by at least one significant other as a support person. In only one case was the husband not in constant attendance. Due to business travel demands this couple had prepared for the likelihood of the father's absence at the time of birth. The women was supported throughout labor and delivery by a female friend who had attended Lamaze classes with the expectant mother.

All subjects had intravenous fluids during labor and had continuous electronic monitoring of their uterine contractions and fetal heart tones. Subjects therefore spent the

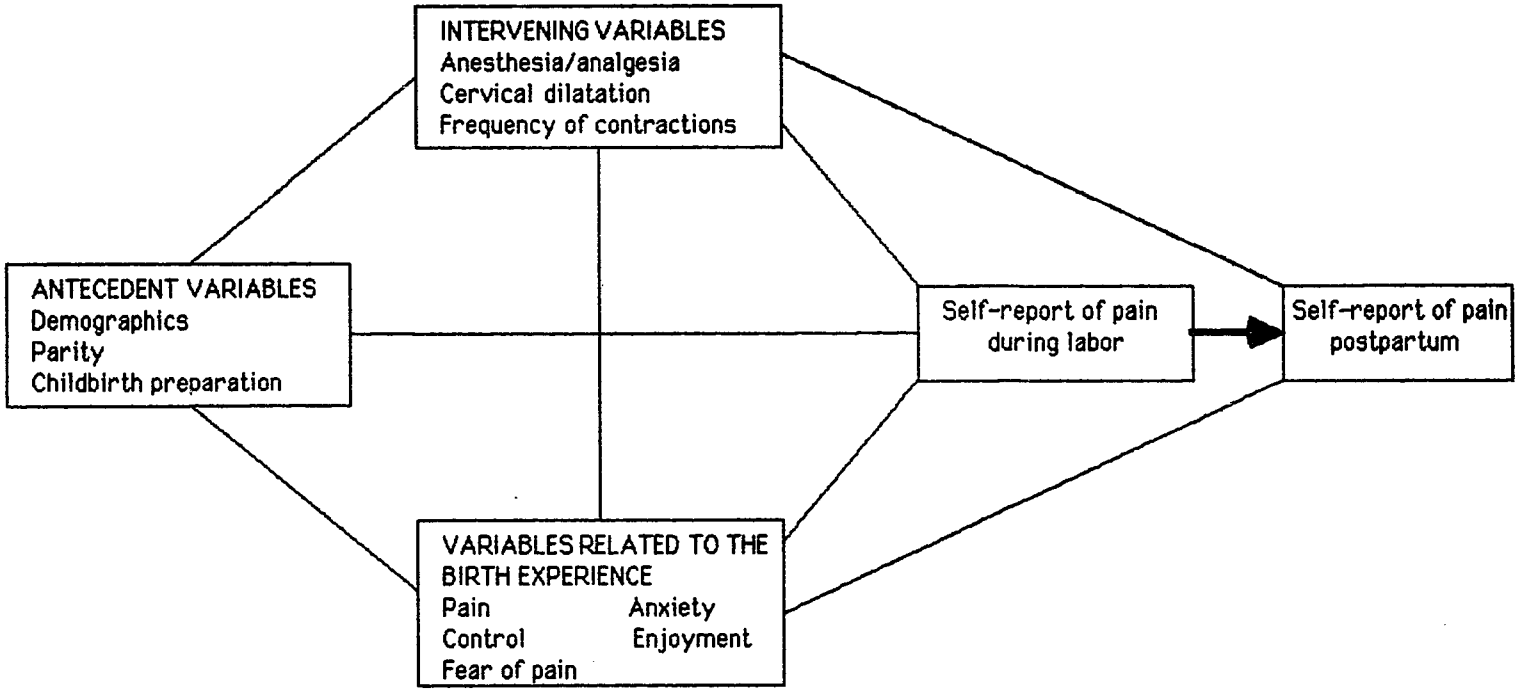

Figure 5. Study variables.

majority of their labors confined to bed where they were encouraged to lie on their sides and change positions frequently.

The hospital had three labor-delivery rooms (LDR) at the time of data collection and all but ten subjects labored, delivered, and recovered in the same room. Although siblings are not permitted to attend the actual delivery, in several cases siblings and other family members, such as grandparents, visited with the parents and the neonate during the immediate recovery period in the LDR.

B. The sample

On each day of data collection women were invited to participate in the study sequentially as they were admitted to the labor/delivery unit. Criteria for subject selection were as follows:

1. 18 to 40 years of age.
2. Term pregnancy (37 to 42 weeks gestation)
3. Single fetus
4. Absence of major medical or obstetrical complications as assessed by chart review and staff consultation.
5. Married and living with spouse.
6. English speaking.

These criteria were chosen in order to control for a number of physiologic and psychosocial variables which may impact on the birth experience.

The nurse investigator consulted with the appropriate staff nurse in the labor unit before approaching a prospective subject. If the staff nurse concurred that the patient was appropriate for inclusion in the study, the study was explained to the woman by the investigator before the consent form was signed (Appendix B). The consent procedure

occurred in early or active labor depending upon the investigator's appearance on the unit and the time of the subject's hospital admission relative to the progress of her labor.

A total of 50 women served as subjects for the study. Only one woman, a 19 year old nullipara, declined to participate in the study. Noticeably distressed on admission with a mildly elevated blood pressure, this parturient developed overt signs of preeclampsia requiring treatment with magnesium sulfate and a dysfunctional labor pattern eventually requiring cesarean section delivery. Four additional nulliparas were dropped from the study when they developed complications of labor or fetal status resulting in cesarean section delivery.

Demographic and obstetrical data were obtained using the form presented in Appendix C and summarized in Table II. As a group the women were highly educated with 58% reporting higher than high school graduation. Sixty-six percent of the women were employed at least part-time prior to the birth of their infant, and 44% were planning to return to work within six months after delivery. A predominately middle to upper middle class socioeconomic status is reflected for the sample in that 56% of the husbands were employed in managerial or professional occupations, 18% in sales or skilled crafts, and another 20% in semiskilled or service occupations. (Occupational data was not obtained from three, 6%, of the subjects.) Of the employed women, 45% were in management or professional roles, and another 45% in sales or clerical work. All but one of the women were caucasian.

Seventeen of the 50 women were nulliparas while the remaining 33 were delivering their second or more child. During the first stage of labor 32 of the women did not receive any sedative or analgesic medication; eight received an analgesic only; one received a sedative only; six received a combination of an analgesic and sedative; and three women received a paracervical block in addition to an analgesic or sedative. Spontaneous rupture of membranes occurred in 12 of the parturients, while artificial rupture was performed in the remaining

TABLE II

DEMOGRAPHIC AND OBSTETRICAL DESCRIPTION OF SAMPLE

Characteristic	Range	$\bar{X}$	*SD*
Maternal age	19 - 36	27.92	4.358
Infant weight[a]	2638 - 4596	3592.98	391.762
Apgar (1 minute)	4 - 9	7.89	.823
Apgar (5 minute)	7 - 9	8.89	.421
Length of labor			
First stage[b]	.88 - 19.17	7.56	4.282
Second stage[c]	2 - 120	28.66	27.448
Third stage[c]	2 - 22	6.90	4.812
Total[b]	1.03 - 20.25	8.14	4.461

	Frequency
Parity	
0	17
1	21
2	5
3	7
Method of delivery	
NSVD[d]	41
Outlet forceps	4
Assisted breech	1
Vacuum Extraction	4
Anesthesia	
Local	19
Pudendal	31
Perineum	
Episiotomy	47
Perineal Laceration	9

[a]Grams.

[b]Hours.

[c]Minutes.

[d]Normal spontaneous vaginal delivery.

38 women. One woman, a multipara, experienced a postpartum hemorrhage and was treated for anemia during her postpartum hospitalization.

At the beginning of the study, criteria for subject selection included the requirement that the onset of parturition had been spontaneous. In order to increase the sample size, this criterion was subsequently dropped. As a result, the sample included five multiparas who had pitocin induction of labor. Rationale for induction of labor included elective (3), and postdates (2, although within the 42 week cutoff for subject selection). Another 14 women (six nulliparas and eight multiparas) had pitocin augmentation of labor. The effect of pitocin on the pain scores of the parturients was explored by a repeated measures analysis of variance with subjects grouped into "no pitocin" and "pitocin" groups. No significant differences were identified for the two groups in mean pain scores on either subscale of the McGill Pain Questionnaire. The results of this analysis are presented in Table III. Subjects who received Pitocin for induction or augmentation of labor were, therefore, included in the total sample.

C. Procedure

A summary of the research procedures and sample size at each stage is presented in Table IV. On admission to the study, each subject was asked to complete the Self-Evaluation in Labor Questionnaire (Appendix D) and the McGill Pain Questionnaire (Appendix E). The Self-Evaluation in Labor Questionnaire is a 21 item instrument which provides a state inventory of anxiety during labor, a scale of confidence in ability to handle labor, a scale of concern regarding the outcome of labor, and a scale of fear of pain in labor (Lederman, E. et al., 1982, unpublished). The McGill Pain Questionnaire (MPQ) provides two pain indices: the Present Pain Intensity (PPI) and the Pain Rating Index (PRI) (Melzack, 1975).

The first stage of labor is commonly divided into early labor (0 to 3 centimeters), active labor (4 to 7 centimeters), and transitional labor (8 to 10 centimeters). Data were collected during each phase of the first stage of labor on the MPQ. Blood pressure and radial

TABLE III

MANOVA ANALYSIS FOR THE EFFECTS OF PITOCIN ON PPI AND PRI PAIN SCALES

Model	PPI[e] *F*	PPI[e] *p*	PRI[f] *F*	PRI[f] *p*
EL[a] AL[b] TL[c] SS[d] (*n*= 4 no pitocin, 2 pitocin)	.571	.492	.924	.391
EL AL SS (*n*= 11 no pitocin, 9 pitocin)	.162	.692	.558	.465
AL TL SS (*n*= 18 no pitocin, 5 pitocin)	.642	.432	.424	.522
AL SS (*n*= 31 no pitocin, 15 pitocin)	2.087	.156	.688	.411

[a]Early labor.
[b]Active labor.
[c]Transitional labor.
[d]Second stage.
[e]Present Pain Intensity.
[f]Pain Rating Index.

TABLE IV

SUMMARY OF RESEARCH PROCEDURES AND SAMPLE SIZE

Early labor	Active labor	Transition	Second stage	Postpartum
MPQ[a] (*n*=24)	MPQ (*n*=46)	MPQ (*n*=23)	MPQ (*n*=50)	MPQ (*n*=50)
SELQ[b] (*n*=26) or	SELQ (*n*=29)			CEI[c] (*n*=50)
BP[d], HR[e] Cervical dilatataion	BP, HR Cervical dilatation	BP, HR Cervical dilatation		LA&DAS[f] (*n*=48)

[a]McGill Pain Questionnaire.
[b]Self-Evaluation in Labor Questionnaire.
[c]Childbirth Experience Interview.
[d]Blood pressure.
[e]Heart rate.
[f]Labor Agency and Delivery Agency Scale.

pulse were obtained between uterine contractions by the investigator at each data collection point. Cervical dilatation was recorded as assessed by either the attending labor nurse or physician immediately prior to the time of data collection. Due to the more limited ability of parturients to respond to an interview questionnaire during the second stage of labor, self-.report of second stage pain was obtained by the MPQ immediately after completion of the third stage of labor and any perineal repair. All forms of medication received by the parturient were also noted.

A number of factors were responsible for the decrease from 46 MPQ responses during active labor to 23 MPQ responses during transitional labor. Only one woman told the investigator that she could not think enough to respond. A number of subjects attempted to respond to the MPQ during transition but were unable to complete the questionnaire due to the frequency and intensity of their contractions which allowed the women little refractory time to collect themselves and respond. In several other subjects the progression of labor was such that transition was not identified by vaginal examination or the rapidity of transition prohibited data collection. Of the three subjects who received a paracervical block during labor, two progressed through transition while napping.

Four women admitted to the study in early labor responded to the Self-Evaluation in Labor Questionnaire a second time during the active phase of the first stage. The remaining 46 subjects completed the Self-Evaluation in Labor Questionnaire one time during either early or active labor depending upon the phase of the first stage during which they entered the study. Lederman et al. (1982, unpublished) have reported that during the transitional phase of labor many parturients are unable to respond to or complete the self-evaluation inventory.

On the second or third postpartum day, retrospective self-report of pain was obtained by the MPQ for the different phases of labor corresponding to the specific in labor data collection points for each subject. Appropriate verbal cues were utilized from the hospital

labor record to help the woman focus on the particular phase of labor for which she was being asked to remember and report her pain. Additionally, each woman's birth experience was explored using the Childbirth Experience Interview (Appendix F). This interview was recorded by audiotape which allowed verbatim transcription of responses to open-ended items to be completed after the interview session. The coded data from the Childbirth Experience Interview (CEI) provides a pain index, an enjoyment index, and an anxiety index for the total birth experience (Norr et al., 1977).

Finally, two paper and pencil instruments were completed by each subject on the day of postpartum data collection. A revised version of the Self-Evaluation in Labor Questionnaire (Appendix G) provided a retrospective measure of the woman's overall state anxiety during labor, her confidence in her ability to handle labor, her concern regarding the outcome of labor, and her fear of pain during labor. The woman's perception of her feelings of control during the labor and delivery experience were measured by the Labor Agency and Delivery Agency Scale (Appendix H) as described by Humenick and Bugen (1981).

D. Reliability and validity of instruments

1. McGill Pain Questionnaire

The PPI of the MPQ is a six level ordinal scale ranging from 0, no pain, to 5, excruciating. The PRI is comprised of 16 subclasses of words forming three major classes describing the sensory qualities of the pain experience in terms of temporal, spatial, pressure, thermal, and other properties; the affective qualities in terms of tension, fear, and autonomic properties; and the subjective overall intensity of the total pain experience in terms of evaluative words (Melzack, 1975; 1983). In addition, the PRI includes four miscellaneous subclasses of verbal descriptors. Three types of measures may be derived from the MPQ: (a) the PPI, represented by the number-word combination chosen as the indicator of overall pain intensity, (b) the PRI, based on the sum of the rank values of words in each subclass, and (c) the total number of words chosen to describe the pain experience. (Only the

PPI and PRI were used in this investigation.) The MPQ can be completed in approximately five minutes by interview (Melzack, 1983).

The reliability of pain measures is particularly difficult to establish due to the instability of the trait as it varies across time and the confounding effects of memory on reliability assessments (Reading, 1983). Mean consistency indicies of 75% (Graham et al., 1980) and 70.3% (Melzack, 1975) have been reported for the MPQ in repeated administrations to groups of cancer patients. In a study of the ability of patients to remember their pain, high consistency on three occasions in MPQ score profiles were also reported for patients experiencing acute neurosurgical pain (Hunter et al., 1979). Additional evidence supporting the reliability of the MPQ was a comparison made of the words selected on the MPQ with descriptors chosen from a checklist format. A broadly similar pain profile was reported on both instruments by 180 subjects (Reading et al., 1983). It has been suggested however that the mode of MPQ administration has a considerable impact on the resulting scores with interview administration of the MPQ yielding higher scores than paper-and-pencil administration (Klepac et al., 1981).

Validity of the MPQ as a pain measure has been explored by a number of investigators. In a comparison of different scales to measure pain intensity, 56 chronic pain patients indicated a significant preference for an adjectival scale over a visual analogue or simple numeric scale (Kremer et al., 1981). Recognizing that clinical diagnoses are associated with different descriptions of pain qualities, Dubuisson and Melzack (1976) tested the ability of the MPQ to discriminate among different pain syndromes. The results of a multiple group discriminant analysis of the questionnaire data indicated that the MPQ scores correcly classified 77% of the pain of 95 patients into eight clinical pain syndromes. A number of factor analytic studies using a variety of subject samples and clinical pain syndromes have generally supported the factor structure of the MPQ. It must be noted however that a study comparing the factor structure of the MPQ scores in groups of women experiencing acute

episiotomy pain, dysmenorrhea, or chronic pelvic pain suggested that acute pain involves less differentiation of sensory, affective, and evaluative dimensions of pain (Reading, 1982). A review by Reading (1983) of studies investigating the factor structure of the MPQ concluded that the data "confirm the distinction between sensory and affective subgroups and lend support to the practice of deriving representative scale scores. . . an evaluative component has also been distinguished, albeit less consistently " (p. 57).

2. Self-Evaluation in Labor Questionnaire

The Self-Evaluation in Labor Questionnaire is a 21 item scale which includes six items from the published State Trait Anxiety Inventory (STAI) and 15 items specific to common worries in labor. Responses to the items are coded from one to four with a high number indicating anxiety. Four subscales are scored from the tool: the six item state anxiety (items numer 1, 2, 3, 5, 9, and 12); an 11 item scale measuring the subject's confidence in her ability to handle labor (items number 6, 8,10,11, 13,14 ,15, 16, 17, 20, and 21); a two item scale assessing concern regarding the outcome of labor (items number 18 and 19); and a two item scale measuring fear of pain in labor (items number 4 and 7). Data on this instrument were originally reported by Lederman et al. (1982, unpublished) which identified the subscales by cluster analysis and reported item-total correlation coefficients.

In the current study, the internal consistency of the four subscales of the Self-Evaluation in Labor Questionnaire (SELQ) was evaluated by coefficient alpha according to the phase of the first stage during which the questionnaire was completed. Similarly, coefficient alpha was also computed for each subscale of the postpartum form of the questionnaire. The alpha coefficients are reported in Table V. All but one coefficient alpha supported an acceptable and fairly strong indication of the internal consistency of the subscales of the SELQ with the highest coefficients being obtained for all subscales for the active labor data. The low coefficient alpha (.377) for scale 2, concern regarding the outcome of labor, for the postpartum data may be due in part to the confounding effect of knowledge of the outcome of

labor on the attempt to retrospectively recall concern experienced during the actual process of labor.

TABLE V

COEFFICIENTS ALPHA FOR SUBSCALES OF THE SELF-EVALUATION IN LABOR QUESTIONNAIRE

Subscale	Early Labor (n=26)	Active Labor (n=29)	Postpartum (n=48)
State anxiety	.689	.859	.745
Scale 1[a]	.811	.898	.857
Scale 2[b]	.579	.889	.377
Scale 3[c]	.747	.867	.834

[a]Confidence in ability to handle labor (11 items).
[b]Concern regarding the outcome of labor (2 items).
[c]Fear of pain in labor (2 items).

3. Childbirth Experience Interview

The Childbirth Experience Interview consists of 49 closed-ended, open-ended, and self-rated items divided into three parts: I. Labor and Delivery, II. Support during Labor, and III. Information about Birth (Norr et al., 1977). Seven items from Part I of the interview are used to compute an Enjoyment Scale (items number 1, 2, 5, 10, 16, 21, and 30), 11 items to compute a Pain Scale (items number 1, 3, 5, 7, 10, 12, 16, 18, 21, 23, and 31), and 13 items to compute an Anxiety Scale (items number 5, 8, 9, 10, 13, 14, 16, 19, 20, 21, 25, 26, and 32). No validity or reliability data have been published for the CEI.

Responses to the open-ended items of the CEI require a Type A coding task which is described by Crittenden and Hill (1971) as requiring a coder to find a specific answer to a

specific question at a given place on an instrument. Although Type A reliability can be increased to nearly perfect by majority rule of several coders, Type A coding tasks usually have high initial reliability levels (Montgomery & Crittenden, 1977).

The interrater reliability of the CEI was investigated in a pilot study by the investigator through analysis of each open-ended item and of the three scores computed from Part I of the interview. Of the 12 open-ended items, seven had a kappa coefficient (k) of .80 or higher, four had k of .69 to .79, while one item had a k of .48. Absolute differences between raters seemed to be equalized as categories were collapsed prior to the computation of each of the three scales. An analysis of variance on each of the three scales (Enjoyment, Pain, and Anxiety) revealed no significant differences between the mean scores of the subjects derived from the codings of the two raters. In addition, intraclass correlation coefficients were .991 for the Enjoyment Scale, .995 for the Pain Scale, and .997 for the Anxiety Scale indicating high reliability between the two sets of scores.

4. Labor Agency and Delivery Agency Scales

The Labor Agency and Delivery Agency Scales consist of nine and ten items respectively and measure a woman's perception of control during the labor and delivery experience. In a study of 37 primigravid women attending Lamaze childbirth preparation classes, these paper-and-pencil instruments had inter-item reliability coefficients of alpha .88 and .89 respectively (Humenick & Bugen, 1981). The data from the current sample resulted in an alpha of .90 for the Labor Agency Scale and .65 for the Delivery Agency Scale.

5. Physical measures

Blood pressures were taken between uterine contractions by the attending nurse or the investigator with the parturient in the lateral position. Wall-mounted (47 to 53 inches from the floor) mercury-gravity manometers (Baumanometer) were used for all blood pressure measurements. The mercury-gravity manometer is considered the standard and most reliable instrument for the measurement of blood pressure by the American Heart

Association ("Blood Pressure Measurement", 1980). Although recalibration of mercury manometers is not necessary, the units used in the investigation are checked quarterly by a medical instrument technician from the hospital's maintenance departement for functional adequacy.

Cervical dilatation was recorded on the basis of digital vaginal examinations performed by the attending nurse or physician. Although differences in dilatation estimates may exist among practitioners, Friedman has concluded that "any limiting inaccuracy of digital examinations, upon which subsequent data and evaluations of labor are to be based, is rather insignificant" (1978, p. 29).

E. Duration of the Study

All data were collected by the investigator during a five month period from April until September, 1985. The investigator was at the clinical site on an essentially "full-time" basis during the majority of the period of data collection.

F. Ethical Considerations

This study did not involve the use of any intrusive procedures which could impact on the health and/or safety of the parturient or fetus. The women as a whole seemed to appreciate the opportunity to discuss their labor experience with an interested professional particularly during the postpartum interview. Postpartally, the women frequently sought confirmation from the investigator regarding certain events or details of their labor experience. The study proposal was reviewed in October, 1984, by the Institutional Review Board of the University of Illinois at Chicago, Graduate College, and approved for exempted review as research involving survey or interview procedures.

Informed consent was obtained on entry into the study. All data, including audiotapes, were coded and reported only by subject number. Confidentiality was assured in conjunction with collection of data and in the use and transcription of tapes. Access to the audio tapes and the identity of the subjects were known only to the investigator.

IV. DATA ANALYSIS AND RESULTS

Individual scores were computed for each subject on the PPI and PRI of the McGill Pain Questionnaire; the four subscales of the Self-Evaluation in Labor Questionnaire; the three subscales of the Childbirth Experience Interview; the PPI and PRI of the postpartum McGill Pain Questionnaire; the Labor Agency and Delivery Agency Scales; and the four subscales of the postpartum Self-Evaluation in Labor Questionnaire. The reliability and validity of the postpartum recall of labor pain on the MPQ was investigated by repeated measures analysis of variance which tested the congruence between the two sets of scores. Correlational analysis was used to evaluate the convergent and discriminate validity of measures of pain and the other variables related to the birth experience. The relationships among the antecedent and labor related variables and the self-report of pain were examined by repeated measures analysis of variance and regression analysis. Finally, correlational study explored the relationships between pain report during labor and the physiologic variables.

A. Reliability and validity of the postpartum recall of labor pain

Subjects rated the intensity of their pain on the PPI and PRI during the early, active, transitional, and second stage of labor. Twenty four parturients completed the MPQ in early labor, 46 in active labor, 23 in transitional labor, and 50 immediately after completion of the second and third stages of labor.

According to the specific phases of labor during which each subject rated her pain, postpartum PPI and PRI ratings were obtained on the second or third postpartum day. One subject, a multipara, did not complete the postpartum MPQ until her fourth postpartal day due to complications resulting from a postpartum bilateral salpingectomy.

Table VI presents the mean times in relation to delivery at which each in-labor measure and the postpartum measures were obtained. In keeping with the family centered

TABLE VI

TIME OF COMPLETION OF THE MCGILL PAIN QUESTIONNAIRE IN RELATION TO DELIVERY

Data point	*n*	Range	*M*	*SD*
Early labor[a]	24	.82 - 7.67	3.937	1.803
Active labor[a]	46	.43 - 6.08	2.129	1.264
Transitional labor[a]	23	.22 - 3.25	1.155	.754
Second stage[b]	50	.27 - 1.50	.822	.314
Postpartum[c]	50	39 - 95	49.490	10.334

[a]Hours prior to delivery computed from recorded hours and minutes.
[b]Hours after delivery computed from recorded hours and minutes.
[c]Hours after delivery as recorded to the nearest hour.

emphasis during the initial post delivery period, the investigator attempted to make the collection of the second stage data as non-intrusive as possible by waiting for a lull in the family activities. This non-intrusive approach is reflected in the mean time, .822 hours, after delivery for the second stage data collection which was well beyond the completion of the third stage and the perineal repair for most subjects. The means of cervical dilatation and contraction frequency for each data collection point during the first stage of labor are presented in Table VII.

Because the repeated observations of labor cannot be considered to be independent of each other, multivariate analysis of variance (MANOVA) was the method of repeated measures analysis as suggested by O'Brien and Kaiser (1985). Since for each analysis the same subjects provided all the data in the model, the repeated measures MANOVA was structured

TABLE VII

CERVICAL DILATATION AND CONTRACTION FREQUENCY FOR EACH MPQ DATA COLLECTION POINT DURING THE FIRST STAGE OF LABOR

Data point	*n*	Cervical dilatation[a]			Contraction frequency[b]		
		Range	$\bar{X}$	*SD*	Range	$\bar{X}$	*SD*
Early labor	24	2 - 4	3.25	.737	3 - 7	4.13	1.262
Active labor	46	5 - 7	5.54	.780	2 - 8	3.40	1.176
Transitional labor	23	7 - 9[c]	8.174	.120	2 - 5	2.91	.868

[a]Centimeters of dilatation as measured by vaginal examination.

[b]Minutes from the beginning of one contraction until the beginning of the subsequent contraction as measured by an electronic tocotransducer.

[c]The MPQ scores of two parturients at 7 cm were included in the transitional phase data on the basis of behavioral signs which indicated the impending end of the first stage of labor. These subjects were both multiparas who did indeed progress into second stage within a very short period of time.

with two within subjects factors. Time-of-report and phase-of-labor were the two factors utilized in the analysis. Phase-of-labor has four potential levels within the analysis (early labor, active labor, transitional labor, and second stage), while time-of-report has two levels (in-labor and postpartum).

The benefit of the MANOVA approach is that each contrast within a set of contrasts remains linked with its own specific error term. This approach eliminates problems associated with average error terms, such as inflated F values, due to violation of the assumption of sphericity in the traditional repeated measures analysis. According to O'Brien and Kaiser (1985), "... spericity is unnatural for most repeated measures data, and we believe that it is commonly violated in most designs with more than two repeated measures" (p. 317).

1. Intensity analysis

The PPI is a six point ordinal scale ranging from 0, 'no pain', to 5, 'excruciating'. A summary of the PPI data across the time-of-report and phase-of-labor factors is presented in Table VIII. The range of responses and magnitude of the standard deviations at each level reflect the wide individual variation in the intensity of labor pain.

Because not all subjects provided data at all collection points, the PPI data were analyzed using four separate models. Only six of the 50 subjects provided data at all four points during labor. Twenty subjects provided data for early, active, and second stage labor; 23 for active, transitional, and second stage labor; and 46 for active and second stage labor.

For each MANOVA model, Bartlett's test of sphericity was not significant ($p>.01$) indicating that the transformed variables were uncorrelated. Given that these data satisfy the symmetry conditions, the univariate statistics are reported. Table IX presents the results of the MANOVA analysis for each of the separate models.

TABLE VIII

PRESENT PAIN INTENSITY (PPI) DATA SUMMARY FOR PHASE-OF-LABOR AND TIME-OF-REPORT

	Time-of-report					
	In-labor			Postpartum		
	Range	*M*	*SD*	Range	*M*	*SD*
Phase-of-labor						
Early labor (*n*=24)	0 - 5	2.38	1.135	0 - 4	1.50	.885
Active labor (*n*=46)	1 - 5	2.83	.926	1 - 5	2.48	1.005
Transitional labor (*n*=23)	1 - 5	2.91	1.125	1 - 5	3.04	1.224
Second stage (*n*=50)	0 - 5	3.36	1.336	0 - 5	3.36	1.495

TABLE IX

PRESENT PAIN INTENSITY (PPI) MANOVAS FOR TIME-OF-REPORT AND PHASE-OF-LABOR

Model	Source of variance	*df*	*MS*	*F*	*p*
EL[a] AL[b] TL[c] SS[d] (*n*=6)	TIME-OF-REPORT	1	.3333	1.818	.235
	error	5	.1833		
	PHASE-OF-LABOR	3	7.8333	7.705	.002*
	error	15	1.0167		
	INTERACTION	3	1.5000	1.698	.210
	error	15	.8833		
EL AL SS (*n*=20)	TIME-OF-REPORT	1	2.7000	6.181	.022*
	error	19	.4368		
	PHASE-OF-LABOR	2	28.3000	19.890	.000*
	error	38	1.4228		
	INTERACTION	2	1.9000	3.967	.027*
	error	38	.4789		
AL TL SS (*n*=23)	TIME-OF-REPORT	1	.1159	.171	.683
	error	22	.6766		
	PHASE-OF-LABOR	2	13.4565	7.748	.001*
	error	44	1.7368		
	INTERACTION	2	.9638	1.626	.208
	error	44	.5926		
AL SS (*n*=46)	TIME-OF-REPORT	1	1.5707	3.187	.081
	error	45	.4929		
	PHASE-OF-LABOR	1	27.3967	14.970	.000*
	error	45	1.8301		
	INTERACTION	1	1.2228	2.339	.133
	error	45	.5228		

[a]Early labor.

[b]Active labor.

[c]Transitional labor.

[d]Second stage.

*Significant at $p < .05$

As indicated in Table IX, a significant difference in the time-of-report factor was found in only one model. For the 20 subjects who provided data for early, active, and second stage labor, their postpartum report of pain on the MPQ differed significantly (p=.022) from their in-labor report. An analysis of variance for each labor stage with one within-subjects factor, time-of-report, identified the source of the significant difference to be the early labor report. The postpartum report of early labor pain intensity was significantly lower than the in-labor report (F= 33.78, p= .000). No differences were identified between the in-labor and postpartum reports for active or second stage labor. In each of the other three models no significant effect for the time-of-report factor was found.

The phase-of-labor factor was significant in all four models indicating that the mean of the PPI scores differed significantly across the phases of labor. In order to identify the source of the difference in PPI scores, a repeated contrast command was entered into the MANOVA specifications. As shown in Table X significant differences were found between early and active labor PPI means and between active and transitional labor PPI means for each model in which the particular contrast was made. No significant differences appeared for the PPI means of transitional versus second stage labor in either the early-active-transitional-second stage model or the active-transitional-second stage model.

A significant interaction effect (p=.027) was found for the early-active-second stage model which also had the significant effect for time of report. As suggested by the previously reported within-subjects analysis of variance by labor stage, examination of the graphic representations for each model presented in Figures 6, 7, 8, and 9 suggest the source of this significant interaction. When the early-active-second stage model (Figure 7) is compared with the active-transitional-second stage (Figure 8) and the active-second stage (Figure 9) models the difference seen in the means of the in-labor and postpartum PPI scores for early labor is apparent.

TABLE X

PRESENT PAIN INTENSITY (PPI) PHASE-OF-LABOR FACTOR REPEATED CONTRASTS

Contrast	Model	*n*	*F*	*p*
EL[a] vs. AL[b]				
	EL-AL-TL-SS	6	9.202	.029*
	EL-AL-SS	20	30.697	.000*
AL vs. TL[c]				
	EL-AL-TL-SS	6	42.250	.001*
	AL-TL-SS	23	16.185	.001*
TL vs. SS[d]				
	EL-AL-TL-SS	6	.488	.516
	AL-TL-SS	23	1.567	.224

[a]Early labor.
[b]Active labor.
[c]Transitional labor.
[d]Second stage.
*Significant at $p < .05$.

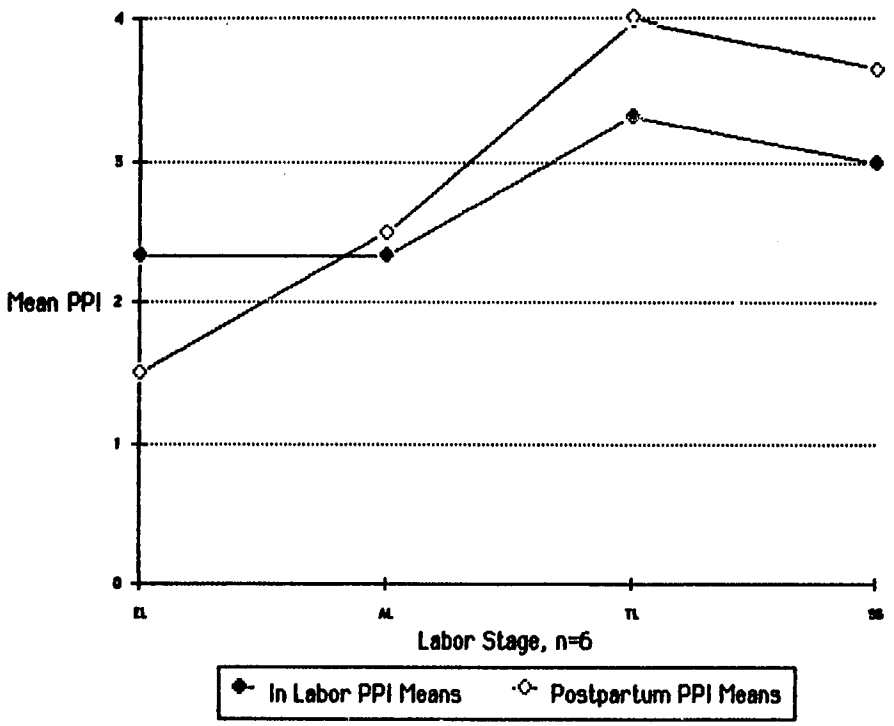

Figure 6. In-labor vs postpartum Present Pain Intensity (PPI) means, EL AL TL SS.

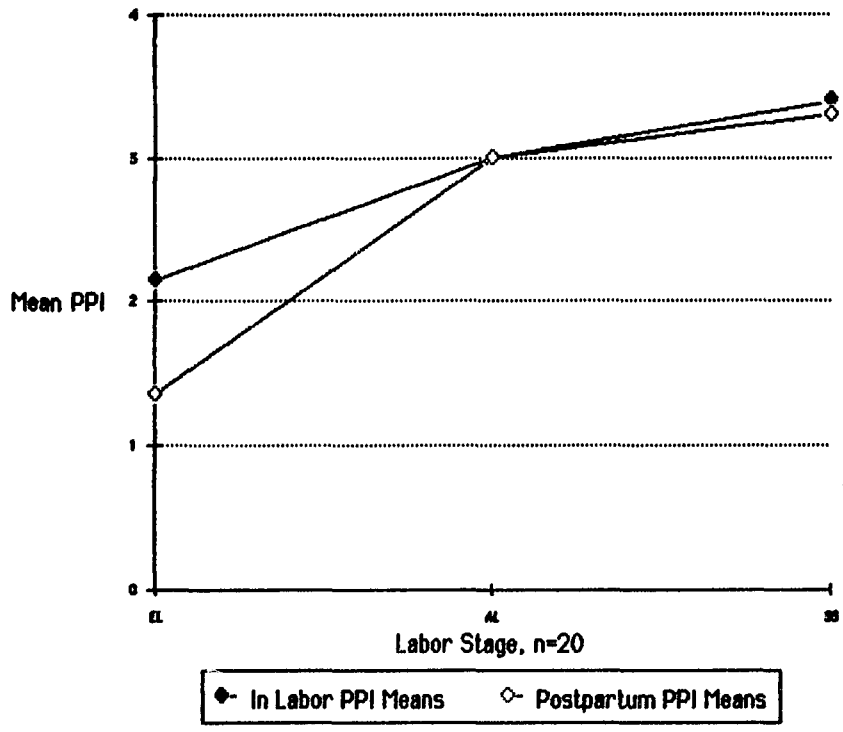

Figure 7. In-labor vs postpartum Present Pain Intensity (PPI) means, EL AL SS.

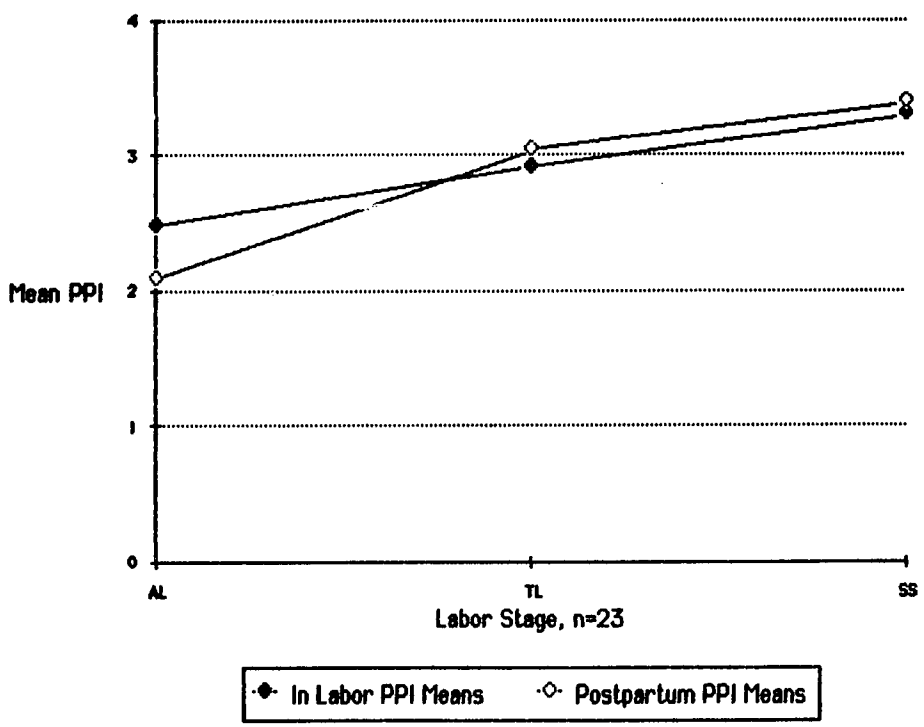

Figure 8. In-labor vs postpartum Present Pain Intensity (PPI) means, AL TL SS.

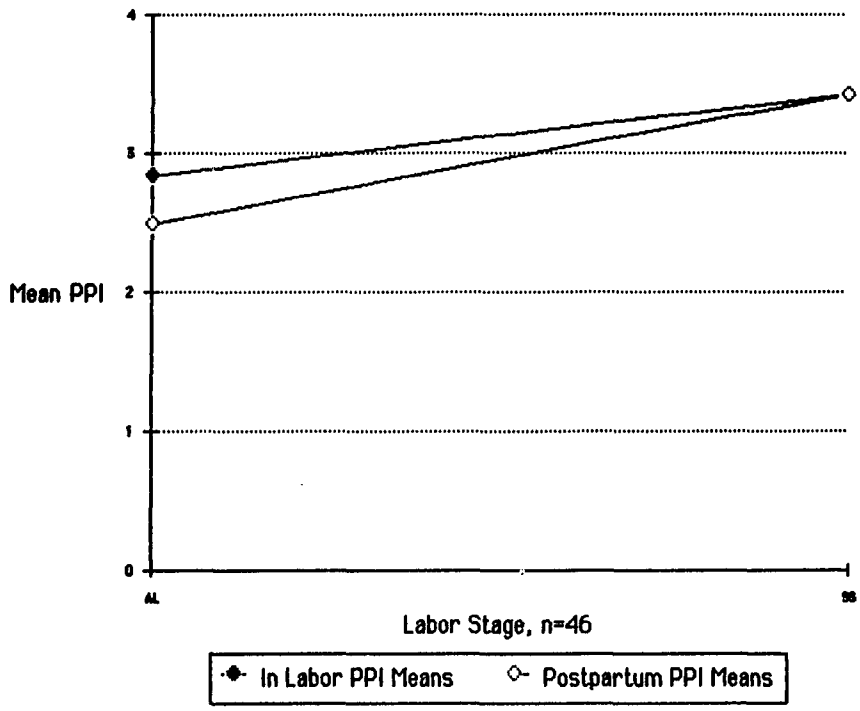

Figure 9. In-labor vs postpartum Present Pain Intensity (PPI) means, AL SS.

Although a visual interaction effect is seen in Figure 6 for the early-active-transitional-second stage model, the small sample size (n=6) of this model and relatively large variance of the PPI scores accounts for the lack of statistical significance. Figure 10 presents the trend of in-labor and postpartum scores for the mean of all observations at each data point. The same visual effect is apparent in that the most difference between means for phases of labor is observed for the early labor measures. For the latter stages of labor a substantive difference in means is no longer apparent.

Non-normality of the residuals was indicated for the PPI scores by a Shapiro-Wilk statistic (Shapiro & Wilk, 1965). Square root transformations were performed on the data as indicated by the method of Box and Cox (1964) for estimating the best transformation to normality. By transforming the variates to square roots, the variances are made independent of the means which assists in achieving a normal distribution (Sokal & Rohlf, 1981). After transformation, the four MANOVA models were run again as presented in Table XI. The same factors were significant for the transformed data as for the original data, except that in the active-second-stage-model the time-of-report factor also reached significance (p=.033). On the ordinal PPI, postpartum recall of labor pain was therefore significantly different than in-labor report in both the early-active-second stage and the active-second stage models. This significant main effect for the time-of-report factor is apparently due to postpartal devaluation of early and active labor pain on the PPI.

2. Pain rating analysis

Scores on the PRI are a summation of the rank values of the words chosen from each subclass and may range from 0 to 78. A summary of the PRI data across the time-of-report and phases-of-labor factors is presented in Table XII. The individuality of labor pain is again reflected in the range of scores and magnitude of variance at each level of the within-subjects factors.

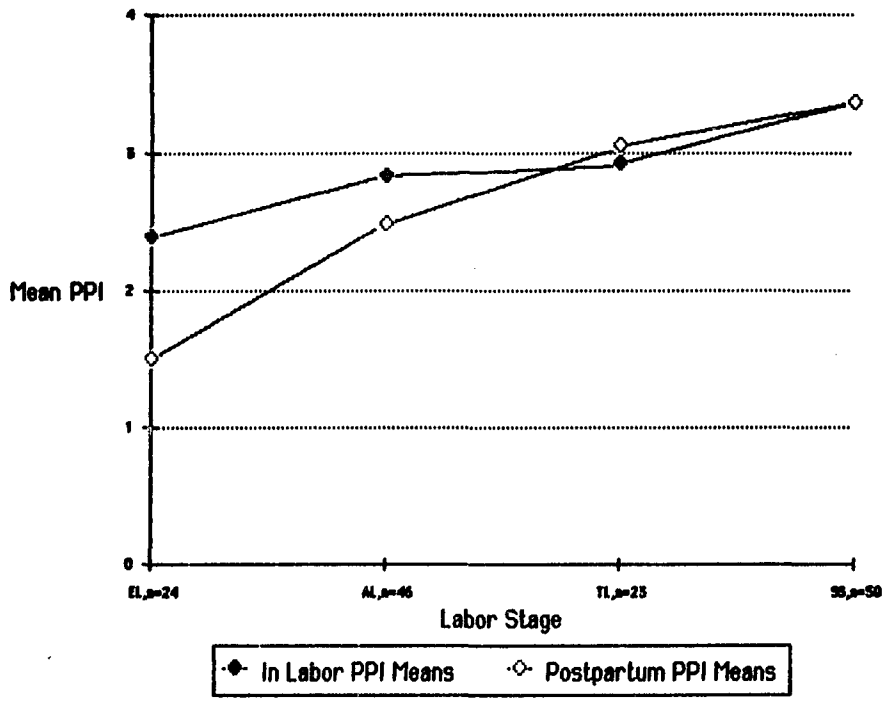

Figure 10. In-labor vs postpartum Present Pain Intensity (PPI) means for total sample, EL AL TL SS.

TABLE XI

SQUARE ROOT TRANSFORMATION OF PRESENT PAIN INTENSITY (PPI), MANOVAS FOR TIME-OF-REPORT AND PHASE -OF-LABOR

Model	Source of variance	*df*	*MS*	*F*	*p*
EL[a] AL[b] TL[c] SS[d]	TIME-OF-REPORT	1	.00343	.269	.626
(*n*=6)	error	5	.01272		
	PHASE-OF LABOR	3	.69363	6.750	.004*
	error	15	.10275		
	INTERACTION	3	.15339	1.765	.197
	error	15	.08691		
EL AL SS	TIME-OF-REPORT	1	.42636	7.464	.013*
(*n*=20)	error	19	.05712		
	PHASE-OF-LABOR	2	3.40340	19.231	.000*
	error	38	.17697		
	INTERACTION	2	.34988	6.692	.003*
	error	38	.05228		
AL TL SS	TIME-OF-REPORT	1	.03755	.703	.411
(*n*=23)	error	22	.05340		
	PHASE-OF-LABOR	2	.90360	4.214	.021*
	error	44	.21445		
	INTERACTION	2	.09898	1.802	.177
	error	44	.05493		
AL SS	TIME-OF-REPORT	1	.20953	4.814	.033*
(*n*=46)	error	45	.04278		
	PHASE-OF-LABOR	1	1.76989	7.887	.000*
	error	45	.22440		
	INTERACTION	1	.11580	2.299	.136
	error	45	.05037		

[a]Early labor.

[b]Active labor.

[c]Transitional labor.

[d]Second stage.

*Significant at $p < .05$.

TABLE XII

PAIN RATING INDEX (PRI) DATA SUMMARY FOR PHASE-OF-LABOR AND TIME-OF-REPORT

	Time-of-report					
	In-labor			Postpartum		
	Range	*M*	*SD*	Range	*M*	*SD*
Phase-of-labor						
Early labor (*n*=24)	3 - 46	23.58	10.185	1 - 43	19.17	9.361
Active labor (*n*=46)	8 - 53	29.13	10.591	3 - 59	27.78	13.542
Transitional labor (*n*=23)	7 - 64	32.48	12.809	11 - 67	38.04	16.623
Second stage (*n*=50)	9 - 68	33.06	13.429	3 - 72	34.88	17.279

The PRI data were analyzed using the same four models of data collection points as presented for the PPI data. Since Bartlett's test of sphericity was again not significant ($p > .01$) for each MANOVA model, the univariate statistics are reported.

As indicated in Table XIII, there were no significant differences found for the time-of-report factor for any of the four specified models. The postpartum PRI scores did not differ significantly from the PRI scores reported during labor.

Identical to the results of the intensity analysis, was the finding that the PRI scores differed significantly across the phases of labor in all four models. The repeated contrast command was again entered into the MANOVA specifications to identify the source of the difference in PRI scores according to phase-of-labor. As presented in Table XIV the mean of

TABLE XIII

PAIN RATING INDEX (PRI) MANOVAS FOR TIME-OF-REPORT AND PHASE-OF-LABOR

Model	Source of variance	*df*	*MS*	*F*	*p*
EL[a] AL[b] TL[c] SS[d]	TIME-OF-REPORT	1	10.0833	.111	.753
(*n*=6)	error	5	91.2333		
	PHASE-OF-LABOR	3	2250.2500	11.898	.002*
	error	15	189.1333		
	INTERACTION	3	167.2500	2.408	.108
	error	15	69.4667		
EL AL SS	TIME-OF-REPORT	1	38.5333	.971	.337
(*n*=20)	error	19	39.6737		
	PHASE	2	3602.0333	22.686	.000*
	error	38	158.7769		
	INTERACTION	2	80.1333	2.509	.095
	error	38	31.9316		
AL TL SS	TIME-OF-REPORT	1	46.3768	.602	.446
(*n*=23)	error	22	76.9980		
	PHASE-OF-LABOR	2	1653.6739	11.559	.000*
	error	44	143.0603		
	INTERACTION	2	215.4420	4.887	.012*
	error	44	44.0860		
AL SS	TIME-OF-REPORT	1	1.3913	.034	.855
(*n*=46)	error	45	41.2469		
	PHASE-OF-LABOR	1	1765.7609	9.305	.004*
	error	45	189.7719		
	INTERACTION	1	106.5217	3.117	.084
	error	45	34.1773		

[a]Early labor.

[b]Active labor.

[c]Transitional labor.

[d]Second stage.

*Significant at $p < .05$.

TABLE XIV

PAIN RATING INDEX (PRI) PHASE-OF-LABOR FACTOR REPEATED CONTRASTS

Contrast	Model	*n*	*F*	*p*
EL[a] vs. AL[b]				
	EL-AL-TL-SS	6	17.909	.008*
	EL-AL-SS	20	41.387	.000*
AL vs. TL[c]				
	EL-AL-TL-SS	6	11.014	.021*
	AL-TL-SS	23	16.993	.000*
TL vs. SS[d]				
	EL-AL-TL-SS	6	.468	.542
	AL-TL-SS	23	.327	.573

[a]Early labor.
[b]Active labor.
[c]Transitional labor.
[d]Second stage.
*Significant at $p < .05$.

the PRI scores for early labor was found to be significantly different than the mean of the PRI scores for active labor in both the early-active-transitional-second stage model (p=.008) and the early-active-second stage model (p=.000). Similarly, the difference in the PRI means for active labor and transitional labor reached significance in both the early-active-transitional-second stage (p=.021) and active-transitional-second stage (p= .000) models. No significant differences were identified between the PRI means for transitional and second stage labor in either model which tested this contrast.

Figures 11, 12, 13, and 14 show the trend of scores across the phases of labor for each model analyzed. A significant interaction effect (p=.012) was found for the active-transitional-second stage model. The graphic representation of this model presented in Figure 13 suggests the source of this interaction to be the cross over of the postpartal PRI means from a devaluation of the in-labor score during active labor to an inflation of the in-labor score for transitional labor. Within subjects analyses of variance for each labor phase confirmed that the mean of the postpartal PRI scores for transitional labor was significantly higher than the mean of the in-labor scores (F= 4.34, p= .049). No significant differences were identified between the in-labor and postpartal scores for active or second stage labor. Although a similar graphic pattern of interaction is seen in Figure 11 of the early-active-transitional-second stage model, the small sample size (n=6) and large variance of this model prohibits the finding of a significant level of interaction. Figures 12 and 14 of the other models do not show a similar suggestion of interaction. Figure 15 presents the trend of in-labor and postpartum scores for the mean of all observations at each data point.

The Shapiro-Wilk statistic indicated that the residuals of the PRI scores were also non-normally distributed. A square root transformation was again indicated by the method of Box and Cox. Table XV presents the results of the MANOVA analysis for the transformed data of the PRI. An identical pattern of significance was found as for the untransformed data.

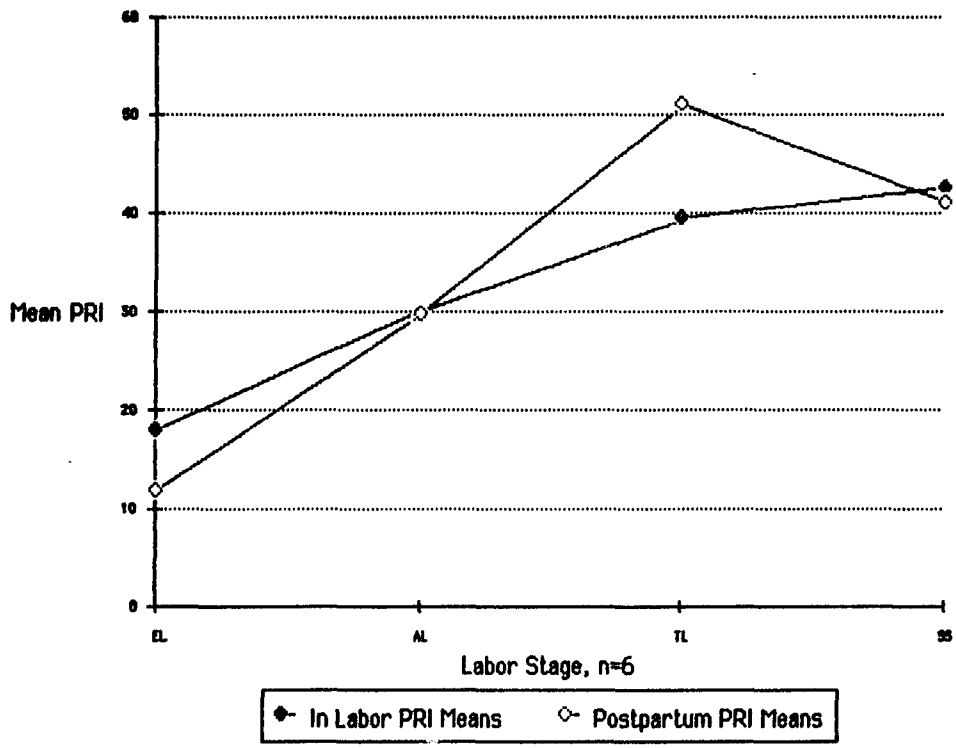

Figure 11. In-labor vs postpartum Pain Rating Index (PRI) means, EL AL TL SS.

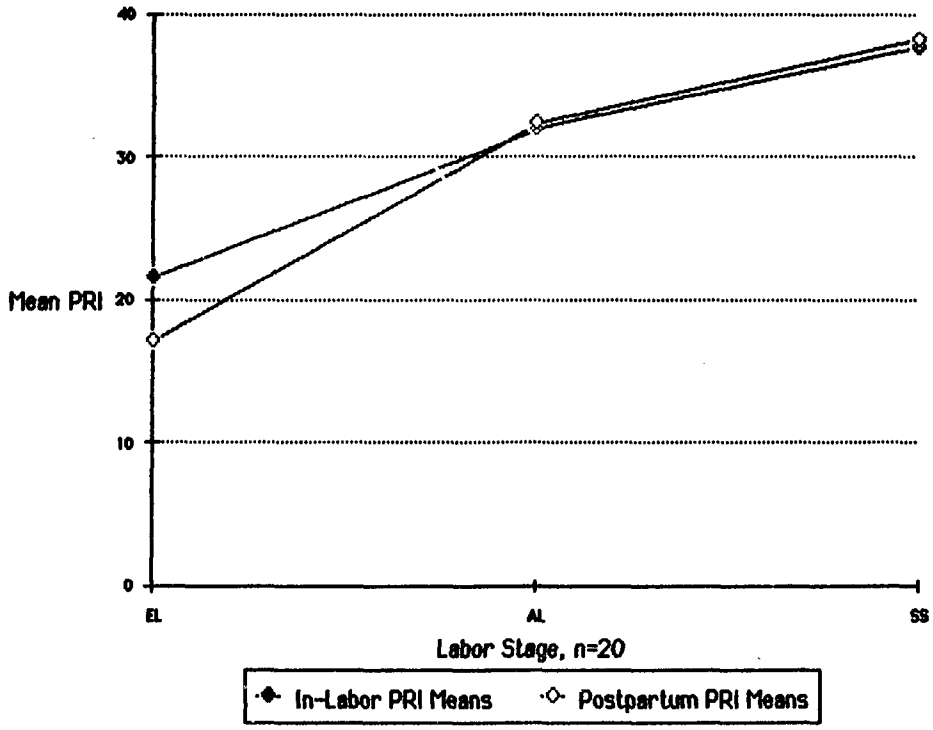

Figure 12. In-labor vs postpartum Pain Rating Index (PRI) means, EL AL SS.

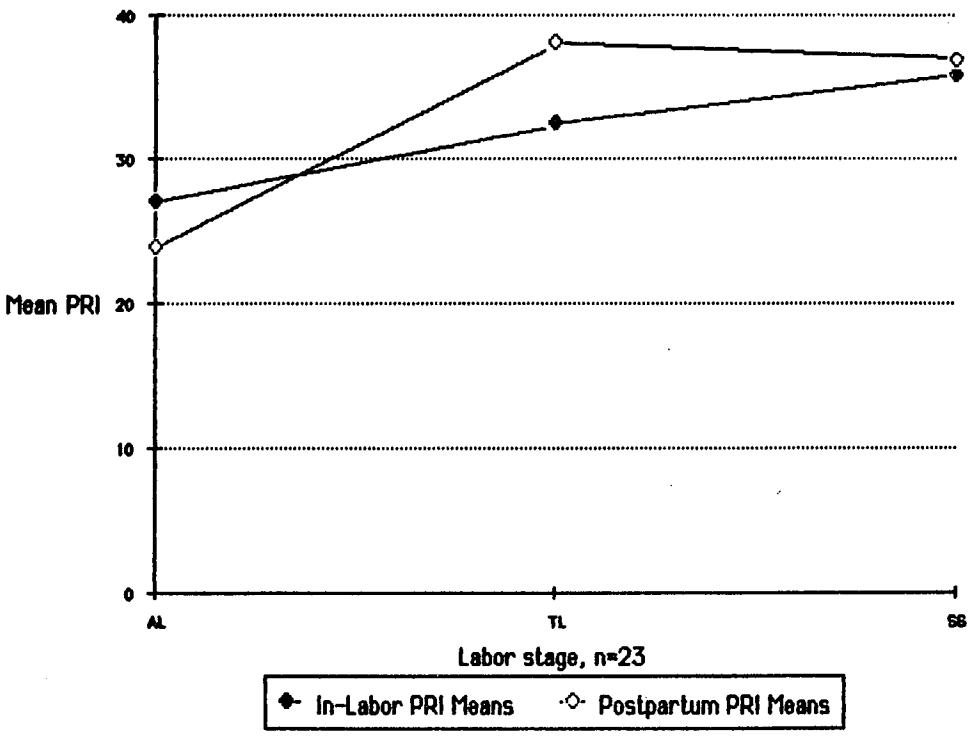

Figure 13. In-labor vs postpartum Pain Rating Index (PRI) means, AL TL SS.

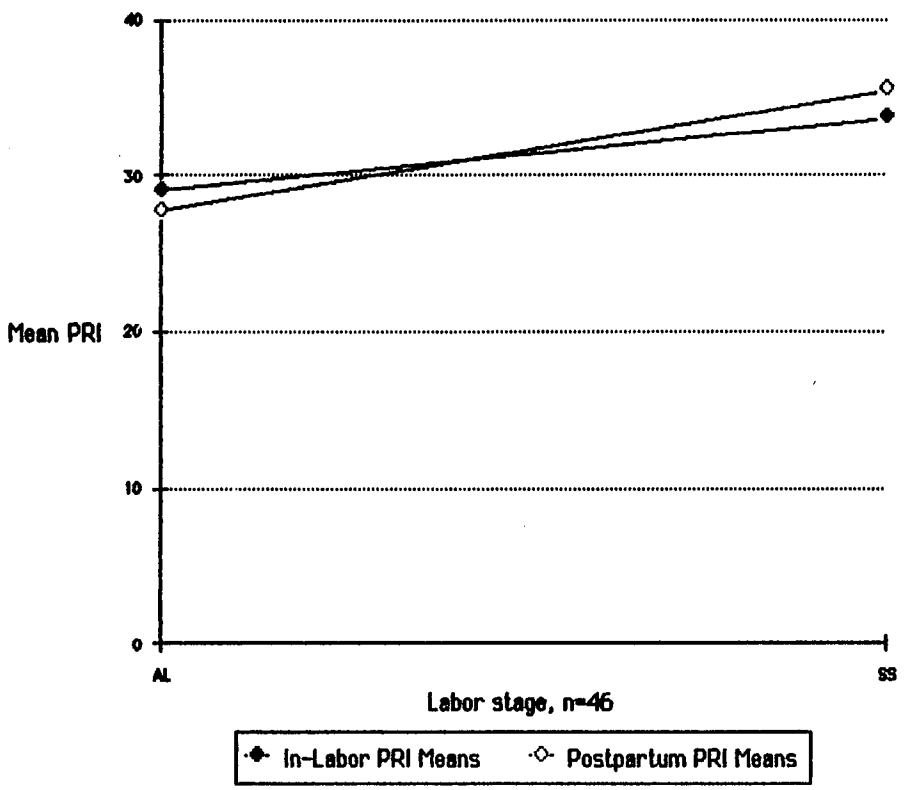

Figure 14. In-labor vs postpartum Pain Rating Index (PRI) means, AL SS.

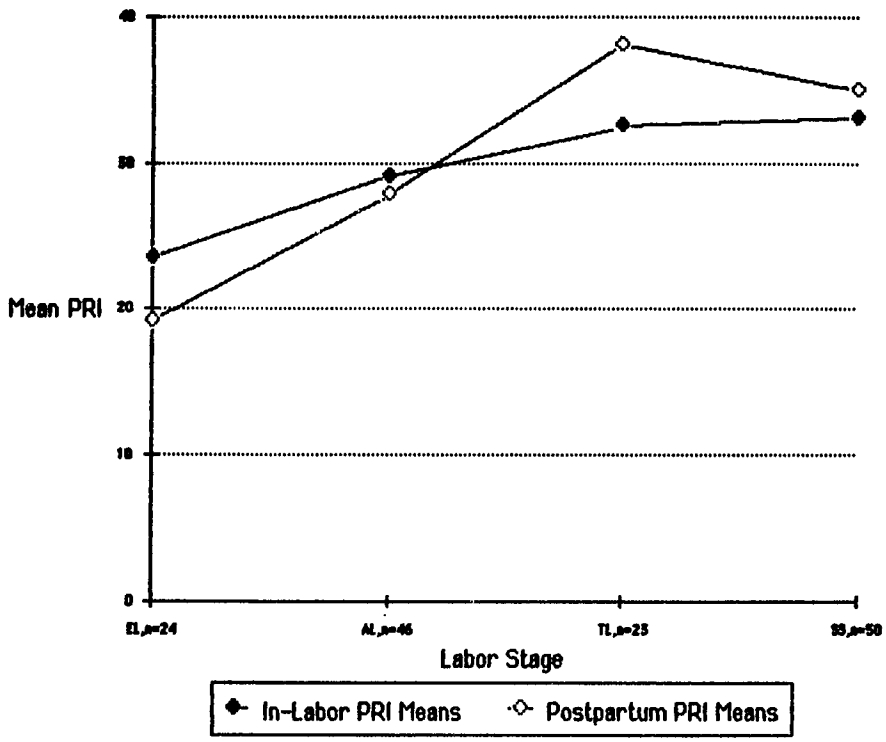

Figure 15. In-labor vs postpartum Pain Rating Index (PRI) means for total sample, EL AL TL SS.

TABLE XV

SQUARE ROOT TRANSFORMATION OF PAIN RATING INDEX (PRI), MANOVAS FOR TIME-OF-REPORT AND PHASE -OF-LABOR

Model	Source of variance	*df*	*MS*	*F*	*p*
EL[a] AL[b] TL[c] SS[d]	TIME-OF-REPORT	1	.01840	.023	.887
(*n*=6)	error	5	.81736		
	PHASE-OF-LABOR	3	19.74123	13.593	.000*
	error	15	1.45234		
	INTERACTION	3	1.35324	2.014	.155
	error	15	.67203		
EL AL SS	TIME-OF-REPORT	1	.90358	2.437	.135
(*n*=20)	error	19	.37079		
	PHASE-OF-LABOR	2	33.42455	26.362	.000*
	error	38	1.26789		
	INTERACTION	2	.85781	2.777	.075
	error	38	.30888		
AL TL SS	TIME-OF-REPORT	1	.00488	.007	.934
(*n*=23)	error	22	.68874		
	PHASE-OF-LABOR	2	13.54548	9.827	.000*
	error	44	1.37846		
	INTERACTION	2	2.13568	4.762	.013*
	error	44	.44846		
AL SS	TIME-OF-REPORT	1	.32696	.834	.366
(*n*=46)	error	45	.39197		
	PHASE-OF-LABOR	1	13.44098	7.698	.008*
	error	45	1.74599		
	INTERACTION	1	.88187	2.308	.136
	error	45	.38203		

[a]Early labor.

[b]Active labor.

[c]Transitional labor.

[d]Second stage.

*Significant at $p < .05$.

B. Convergent and discriminant validity of pain measures

The multitrait-multimethod matrix as described by Campbell and Fiske (1959) was chosen to investigate the convergent and discriminant validity of the pain measures used in this study. The requirements for the construction of the multitrait-multimethod matrix (Waltz et al., 1984) were met in that pain and anxiety, two different constructs, were measured; a questionnaire and an interview, two different methodologies, were used to measure each construct; and the instruments were administered to each subject postpartally representing the same relative point in time. The final condition for the construction of the matrix, the assumption that the performance of a subject on each measure is independent and is not influenced or biased by any other measure, was not met. The computation of the pain and anxiety scores from the interview (CEI) includes the recoding of four identical items which are combined with a number of independent items from the interview schedule. The presence of these overlapping items eliminates the possibility of total independence between the pain and anxiety scores computed from the CEI.

Since pain as measured by the CEI represents a composite averaging of report across the phases of labor, a composite postpartum MPQ score was computed for each subject by averaging the sum of the PPI and PRI across the phases of labor. This composite score for the postpartum MPQ was used to calcuate the first multitrait-multimethod matrix presented in Table XVI. Since only six subjects completed the MPQ in each of the four phases of labor, only these six provided postpartum report on the MPQ across all phases of labor. Therefore, Table XVI must be interpreted with caution and considered extremely preliminary.

Validity coefficients are represented in the multitrait-multimethod matrix by the correlations found in the monotrait-multimethod positions representing the convergence of the two measures. The convergent validity of both the pain and anxiety measures is supported by the relatively high positive correlations between different measures of each construct,

TABLE XVI

MULTITRAIT-MULTIMETHOD MATRIX FOR PAIN AND ANXIETY AS EVALUATED ACROSS ALL PHASES OF LABOR, $n = 6$

	Traits	Questionnaire		Interview	
		Pain	Anxiety	Pain	Anxiety
Questionnaire	Pain[a]				
	Anxiety[b]	.464			
Interview	Pain[c]	.641	.237		
	Anxiety[d]	.213	.723	-.403	

[a]Averaged composite MPQ score.
[b]State anxiety from SELQ.
[c]Pain index from CEI.
[d]Anxiety index from CEI.

.641 and .723 respectively. The heterotrait-heteromethod correlations (.213 and.237) and the heterotrait-monomethod correlations (.464 and -.403) are all substantially lower than the validity coefficient (.641) for pain supporting the discriminant validity of the pain measures. A similar pattern of intercorrelations also supports the discriminant validity of the anxiety measure. The tenuous nature of this matrix is, however, evident in the negative correlation between the pain and anxiety indices of the interview (heterotrait-monomethod) which is not in the theoretically predicted direction and may be totally spurious.

In order to increase the sample size available for the multitrait-multimethod matrix, recalulations were made for the pain index of the CEI and the composite pain score of the MPQ including only responses based upon postpartum self-report of the active and second

stage of labor. Intercorrelations were recalculated based upon the responses of 44 subjects and are reported in Table XVII.

TABLE XVII

MULTITRAIT-MULTIMETHOD MATRIX FOR PAIN AND ANXIETY AS EVALUATED FOR ACTIVE AND SECOND STAGE LABOR, n=44

		Questionnaire		Interview	
	Traits	Pain	Anxiety	Pain	Anxiety
Questionnaire	Pain[a]				
	Anxiety[b]	.504	.745[e]		
Interview	Pain[c]	.437	.407		
	Anxiety[d]	.356	.521	.249	

[a]Averaged composite MPQ score, computed from active labor and second stage recall.

[b]State anxiety from SELQ.

[c]Pain index from CEI, computed from active labor and second stage items.

[d]Anxiety index from CEI.

[e]Coefficient alpha.

Although all correlations are now in the predicted direction, the convergent and discriminant validity of the pain and anxiety measures is not as strongly supported as in the first multitrait-multimethod matrix. Although convergent validity of the pain measures is indicated by the coefficient of .437 (p=.002), the pattern of intercorrelations required to support the discriminant validity of the measures is no longer present. The validity coefficient is not, as expected, substantially higher than the heterotrait-monomethod

correlations (.407 and .356) and is actually lower than the heterotrait-monomethod correlation for the questionnaire method (.504). These correlations suggest that the validity coefficient of the pain measures does not represent as much common factor variance as is represented in common method variance between the questionnaire measures of pain and anxiety. Similarly, the validity coefficient for the anxiety measures (.521) is only slightly higher than the heterotrait-monomethod correlation between pain and anxiety as measured by questionnaire (.504). The other relationships for the anxiety coefficients remain in the predicted direction and pattern.

Correlations were also computed between the two pain scores and the postpartum scores for fear of pain in labor, feelings of control and birth enjoyment as presented in Table XVIII. Supporting the construct validity of both pain measures is a pattern of correlations with the other variables that is consistent with theoretical predictions. Pain, as measured by either instrument, is positively associated with an increased fear of pain and decreased confidence in the ability to handle labor. Further, increased feelings of control during labor and increased enjoyment of birth are negatively associated with pain. All of these relationships are of moderate magnitude and statistically significant ($p < .05$).

As a final evaluation of the convergent and discriminant validity of the McGill Pain Questionnaire, correlation coefficients were computed between the in-labor and postpartum scores on both the PPI and PRI. Separate correlation matrices for the PPI and PRI are presented in Tables XIX and XX respectively. Support for the convergent validity between the in-labor and pospartum scores on both the PPI and PRI is evident in that for all phases of labor the highest positive correlations are found between in-labor and postpartum scores for similar phases of labor. As expected from the results of the repeated measures analysis, convergence between the in-labor and postpartum scores is greater for the multidimensional PRI than the ordinal PPI.

TABLE XVIII

CORRELATION COEFFICIENTS OF COMPOSITE POSTPARTUM PAIN SCORES AND FEAR OF PAIN, CONFIDENCE IN ABILITY TO HANDLE LABOR, FEELINGS OF CONTROL, AND BIRTH ENJOYMENT, n=44

	Pain (MPQ)[a]		Pain (CEI)[b]	
	r	p	r	p
Postpartum variables				
Fear of pain[c]	.438	.001*	.347	.010*
Confidence[d]	.356	.009*	.425	.002*
Feelings of control[e]	-.522	.000*	-.439	.001*
Birth enjoyment[f]	-.441	.001*	-.280	.033*

[a]Averaged composite MPQ score, computed from active labor and second stage recall.

[b]Pain index from CEI, computed from active and second stage items.

[c]Scale 3 of the postpartum SELQ.

[d]Scale 1 of the postpartum SELQ (a high score indicates low confidence in ability to handle labor).

[e]Total agency score from LA&DAS.

[f]Enjoyment index from CEI.

*Significant at $p < .05$, one-tailed.

TABLE XIX

CORRELATION MATRIX OF IN-LABOR AND POSTPARTUM PRESENT PAIN INTENSITY (PPI) SCORES

	In-labor			
	Early labor	Active labor	Transition	Second stage
Postpartum				
Early labor	.671* (24)[a]	-.068 (20)	.000 (6)	-.459* (24)
Active labor	.353 (20)	.688* (46)	.390* (23)	.181 (46)
Transition	.000 (6)	.213 (23)	.498* (23)	.364* (23)
Second stage	-.179 (24)	.172 (46)	.095 (23)	.669* (50)

[a]Subsample size, (n).
*Significant at $p < .05$, one-tailed.

TABLE XX

CORRELATION MATRIX OF IN-LABOR AND POSTPARTUM PAIN RATING INDEX (PRI) SCORES

	In-labor			
	Early labor	Active labor	Transition	Second stage
Postpartum				
Early labor	.741* (24)[a]	.657* (20)	-.128 (6)	-.143 (24)
Active labor	.472* (20)	.802* (46)	.493* (23)	.404* (46)
Transition	-.276 (6)	.438* (23)	.649* (23)	.854* (23)
Second stage	-.047 (24)	.407* (46)	.444* (23)	.835* (50)

[a]Subsample size, (*n*).
*Significant at $p < .05$, one-tailed.

C. Effect of selected variables on pain report

Although no consistent significant differences were identified between the in-labor and postpartum report of pain on the MPQ, the effects of other variables were explored according to their impact upon the reliability of postpartum recall and their relationships with pain at various phases of labor. Potential differences in reliability of postpartum recall were investigated between primiparas and multiparas and women who reported different levels of preparation for childbirth. The two PPI phase-of-labor models in which the time-of-report factor was found to be significantly different were subjected to further analysis using anxiety, fear of pain, feelings of control, and birth enjoyment as covariates.

Since only 16 of the 50 women received any analgesia/anesthesia during labor and level of medication had no significant correlations with any of the pain reports, no analysis for this variable is reported.

In keeping with the use of the MPQ in clinical pain research, the remainder of the analysis will use the PRI as a multidimensional scale of pain self-report.

1. Effects of selected variables on the postpartum recall of labor pain

a. Parity and the recall of labor pain

The effects of parity on the reliability of the recall of labor pain was explored using the MANOVA repeated measures analysis with the subjects grouped as primiparas or multiparas. The early-active-transitional-second stage model was not considered for this investigation since only one primipara could be included in this model.

The results of the MANOVA analyses for the remaining three models are presented in Table XXI for both the PPI and the PRI. Parity had no significant main effect or interaction with the recall of pain for either scale in any of the models.

b. Childbirth preparation and the recall of labor pain

With the subjects grouped into unprepared, Lamaze prepared, or previous Lamaze preparation, repeated measures MANOVA was also utilized to investigate the effects of childbirth preparation on the postpartum recall of labor pain. The early-active-transitional-second stage model was not used for analysis due to insufficient subsample sizes. Table XXII shows that there were no significant main or interaction effects for level of preparation on the PPI or PRI in any of the analyzed models.

TABLE XXI

MANOVA ANALYSIS FOR THE EFFECT OF PARITY ON THE POSTPARTUM RECALL OF LABOR PAIN

Model	Source of variance	*df*	Present Pain Intensity (PPI) *MS*	*F*	*p*	Pain Rating Index (PRI) *MS*	*F*	*p*
EL AL SS	Parity	1	.0203	.06	.807	37.644	.08	.786
(*n*=6 primip	error	18	.3295			494.281		
14 multip)	Recall[a]	1	.3699	6.14	.023*	26.006	.62	.440
	Parity by recall	1	.0006	.00	.922	2.173	.05	.822
	error	18	.0603					
AL TL SS	Parity	1	.3100	.78	.386	925.435	1.27	.272
(*n*=7 primip	error	21	.3963			726.878		
16 multip)	Recall	1	.1235	2.65	.119	1.740	.02	.879
	Parity by recall	1	.1956	4.19	.053	159.885	2.19	.154
	error	21	.0466			73.051		
AL SS	Parity	1	.5008	1.77	.190	129.137	.26	.611
(*n*=15 primip	error	44	.2821			493.155		
31 multip)	Recall	1	.2437	5.68	.022*	10.771	.26	.612
	Parity by recall	1	.0384	.89	.349	39.141	.95	.336
	error	44	.0429			41.295		

Note: The PPI analysis is reported for the square root transformation of the PPI scores.

[a]Time-of-report factor.

*Significant at $p < .05$.

TABLE XXII

MANOVA ANALYSIS FOR THE EFFECT OF CHILDBIRTH PREPARATION ON THE POSTPARTUM RECALL OF LABOR PAIN

Model	Source of variance	*df*	Present Pain Intensity (PPI) *MS*	*F*	*p*	Pain Rating Index (PRI) *MS*	*F*	*p*
EL AL SS	Prepared	2	.7573	2.90	.082	482.208	1.03	.379
(*n*=6 U[a]	error	17	.2609			468.840		
6 L[b]	Recall[d]	1	.4939	9.51	.007*	39.142	.92	.350
8 P[c])	Prepared by recall	2	.1012	1.95	.173	16.979	.40	.676
	error	17	.0519			42.344		
AL TL SS	Prepared	2	.3012	.75	.485	2009.677	3.30	.058
(*n*=6 U	error	20	.4015			608.526		
9 L	Recall	1	.0307	.62	.442	110.203	1.89	.183
8 P)	Prepared by recall	2	.0894	1.79	.192	266.887	4.60	.023*
	error	20	.0498			58.009		
AL SS	Prepared	2	.7294	2.74	.076	1116.803	2.45	.098
(*n*=12 U	error	43	.2664			455.683		
19 L	Recall	1	.1883	4.27	.045*	1.003	.02	.876
15 P)	Prepared by recall	2	.0149	.34	.715	47.868	1.17	.320
	error	43	.0441			40.939		

Note: The PPI analysis is reported for the square root transformation of the PPI scores.

[a]Unprepared.

[b]Lamaze prepared.

[c]Previous Lamaze.

[d]Time-of-report factor.

*Significant at $p < .05$

c. Anxiety, fear of pain, feelings of control, birth enjoyment and the recall of labor pain on the Present Pain Intensity scale

In an attempt to identify variables which may impact on the reliability of the postpartum recall of labor pain, analysis of covariance with the MANOVA approach was advanced for the two PPI models (early-active-second stage and active-second stage) in which a significant main effect had been identified for the time-of-report factor. As reported in Table XXIII, when state anxiety was controlled the time-of-report factor was no longer significant in any of the specified models.

Less consistent results were found for each of the other covariates presented in Table XXIII. Although controlling for fear of pain in the two active-second stage models eliminated the significant effect for time-of-report, such was not the case for the early-active-second stage model which remained significant ($p = .015$). Holding feelings of control constant did not change the significant finding for the early-active-second stage model, but did eliminate the main effect for time-of-report in the active-second stage model. The time-of-report factor remained significant in both models using birth enjoyment as the covariate.

2. Effects of selected variables on pain report during labor

a. Parity and pain

Table XXIV presents a demographic and obstetrical comparison of the primiparas and multiparas. As would be expected, the mean length of labor for multiparas was significantly less than that for primiparas.

Comparisons were also made between the primiparas and multiparas on the means of the four subscales of the Self-Evaluation in Labor Questionnaire and are presented in Table XXV. During early labor, primiparas were found to have significantly greater state anxiety and less confidence in their ability to handle labor than multiparas. No differences were found during early labor in concern regarding the outcome of labor or fear of pain. Active

TABLE XXIII

MANCOVA ANALYSIS FOR THE EFFECTS OF ANXIETY, FEAR OF PAIN, CONTROL, AND BIRTH ENJOYMENT ON THE RELIABILITY OF POSTPARTUM RECALL ON THE PRESENT PAIN INTENSITY (PPI)

Covariate	Model	*df*	*MS*	*F*	*p*
EL Anxiety[a]	EL AL SS, *n*=19	1	.23369	3.67	.072
	error	17	.06363		
	AL SS, *n*=21	1	.02220	.49	.490
	error	19	.04475		
AL Anxiety[b]	AL SS, *n*=28	1	.05893	1.37	.253
	error	26	.04317		
EL Fear of pain[c]	EL AL SS, *n*=19	1	.43025	7.25	.015*
	error	17	.05931		
	AL SS, *n*=21	1	.05471	1.31	.267
	error	19	.04178		
AL Fear of pain[d]	AL SS, *n*=28	1	.05476	1.24	.275
	error	26	.04402		
Control[e]	EL AL SS, *n*=19	1	.39832	6.61	.019*
	error	18	.06026		
	AL SS, *n*=44	1	.15102	3.75	.059
	error	43	.04023		
Enjoyment[f]	EL AL SS, *n*=20	1	.42636	7.46	.012*
	error	19	.05712		
	AL SS, *n*=46	1	.20593	4.81	.033*
	error	45	.04278		

[a]State anxiety from the SELQ administered during early labor as covariate for the in-labor pain score with the postpartum state anxiety on the SELQ as covariate for the postpartum pain score.

[b]State anxiety from the SELQ administered during active labor as covariate for the in-labor pain scores with the postpartum state anxiety on the SELQ as covariate for the postpartum pain score.

[c]Fear of pain from Scale 3 of the SELQ administered during early labor as covariate for the in-labor pain score with the postpartum Scale 3 of the SELQ as covariate for the postpartum pain score.

[d]Fear of pain from Scale 3 of the SELQ administered during active labor as covariate for the in-labor pain scores with the postpartum Scale 3 of the SELQ as covariate for the postpartum pain score.

[e]Control as measured by the Labor Agency or Delivery Agency Scales.

[f]Enjoyment Index from the CEI.

*Significant at $p = .05$.

TABLE XXIV

DEMOGRAPHIC AND OBSTETRICAL COMPARISON OF PRIMIPARAS AND MULTIPARAS

Characteristic	Primips, n=17 $\bar{X}$	Multips, n=33 $\bar{X}$
Age	26.18	28.84
Infant weight[a]	3566.9	3607.3
Apgar (1 minute)	7.94	7.88
Apgar (5 minute)	8.88	8.91
Length of labor		
First stage[b]*	10.04	6.29
Second stage[c]*	56.59	14.27
Total[b]*	11.04	6.64
	Primip frequency	Multip frequency
Method of delivery		
NSVD[d]	10	31
Outlet forceps	4	0
Assisted breech	1	0
Vacuum extraction	2	2
Medication in labor		
None	7	25
Analgesia only	4	4
Sedative only	1	0
Analgesia & sedative	3	3
PCB[e] & analgesia &/or sedative	2	1
Anesthesia		
Local	6	13
Pudendal	11	20
Pitocin		
None	11	20
Induction	0	5
Augmentation	6	8

[a]Grams.

[b]Hours.

[c]Minutes.

[d]Normal spontaneous vaginal delivery.

[e]Paracervical block.

*Significantly different by t-test at $p < .05$.

TABLE XXV

COMPARISON OF PRIMIPARAS AND MULTIPARAS
ON THE FOUR SUBSCALES OF THE SELQ FOR EARLY AND ACTIVE LABOR

	Primiparas		Multiparas			
	n	$\bar{X}$	*n*	$\bar{X}$	*t*[a]	*p*
Early labor						
Anxiety	8	15.0	18	11.39	2.70	.021*
Scale 1[b]	8	22.13	18	16.72	2.4	.036*
Scale 2[c]	8	2.75	18	2.11	1.29	.238
Scale 3[d]	8	4.63	18	3.56	1.46	.173
Active labor						
Anxiety	11	15.18	18	14.22	.62	.540
Scale 1	11	25.09	18	21.22	1.54	.136
Scale 2	11	2.82	18	3.11	-.59	.562
Scale 3	11	4.45	18	4.89	-.70	.488

[a]Two-tailed t-test using separate variance estimate.
[b]Confidence in ability to handle labor.
[c]Concern regarding the outcome of labor.
[d]Fear of pain in labor.
*Significant at $p < .05$.

labor measures revealed no significant differences between primiparas and multiparas on any of the four subscales.

Using the MANOVA approach to the repeated measures design, a mixed between-within-subjects analysis was advanced to investigate the effect of parity on the pain reported during labor. In the MANOVA design, parity is the between-subjects factor and stage-of-labor is the within-subjects factor. The same four models of phases of labor as described in section A.1. Intensity analysis were considered for analysis. Of the six subjects who provided data during early, active, transitional, and second stage, only one subject was a primipara. The early-active-transitional-second stage model was, therefore, not utilized for the study of the effect of parity on pain.

The results of the MANOVA analysis for each of the three models considered is presented in Table XXVI. Since the assumption of sphericity was again upheld in all models (p >.01), the univariate statistics are reported. No significant effect of parity on the PRI scores was found in any of the models considered. Consistent with the previous findings that the PRI scores were significantly different across the phases of labor, the phase-of-labor factor was significant in the early- active-second stage (p=.001) and the active-transitional-second stage (p= .042) models. The phase-of-labor factor did not reach significance in the active-second stage model (p= .132).

The most important finding was the significant interaction effect in all models, indicating that the trend of pain scores across the phases of labor was not the same for primiparas and multiparas. Comparison of the graphic representations of the three models in Figures 16, 17, and 18 shows the consistency of the interaction pattern. As confirmed by oneway analysis of variance, multiparas had significantly lower mean PRI scores for early labor (F= 8.41, p= .008). Differences between the two groups were not significant for active (F= .64, p= .428), transitional (F= .18, p= .672), or second stage labor (F= 3.68, p= .061).

TABLE XXVI

PAIN RATING INDEX (PRI) MANOVAS FOR PARITY AND PHASE-OF-LABOR

Model	Source of variance	*df*	*MS*	*F*	*p*
EL[a] AL[b] SS[c]	Parity	1	10.864	.053	.820
(*n*=6 primip	error	18	204.154		
14 multip)	Phase-of-labor	2	671.831	8.362	.001*
	Interaction	2	391.831	4.877	.013*
	error	36	80.340		
AL TL[d] SS	Parity	1	158.000	.498	.488
(*n*=7 primip	error	21	317.518		
16 multip)	Phase-of-labor	2	158.662	3.195	.050*
	Interaction	2	356.488	7.178	.002*
	error	42	49.658		
AL SS	Parity	1	155.234	.802	.375
(*n*=15 primip	error	44	193.617		
31 multip)	Phase-of-labor	1	156.200	1.969	.168
	Interaction	1	599.678	7.559	.009*
	error	44	79.327		

[a]Early labor.

[b]Active labor.

[c]Second stage.

[d]Transitional labor.

*Significant at $p < .05$.

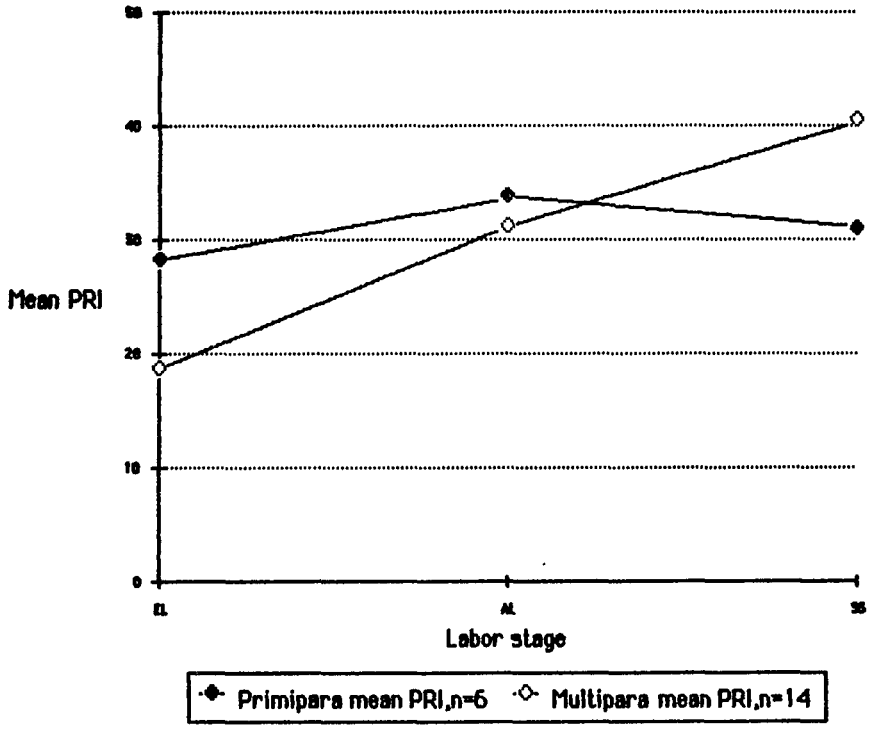

Figure 16. Primipara vs multipara PRI, EL AL SS.

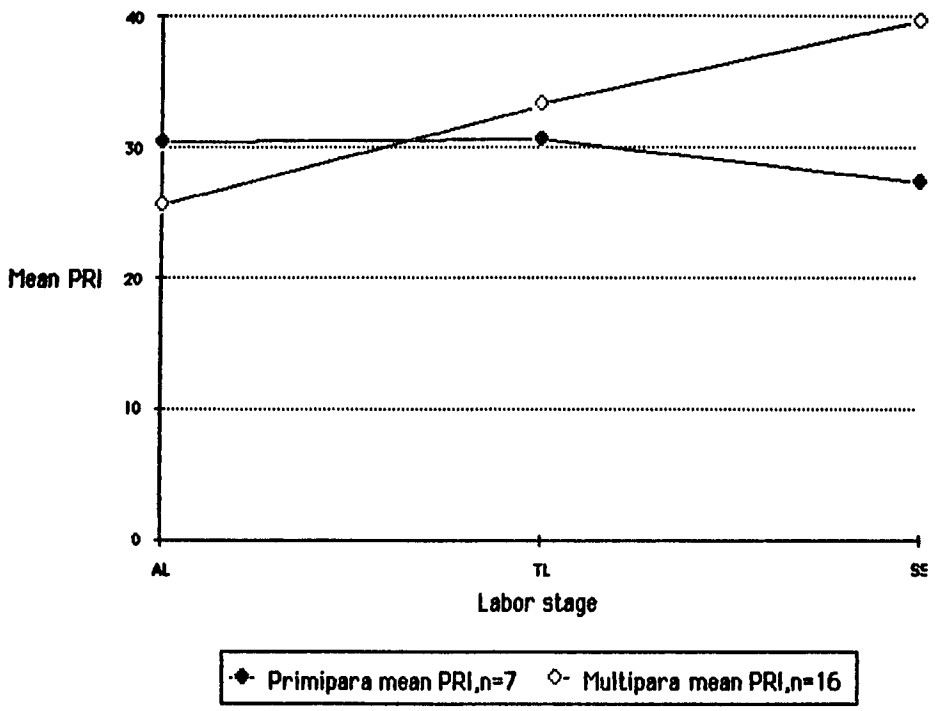

Figure 17. Primipara vs multipara PRI, AL TL SS.

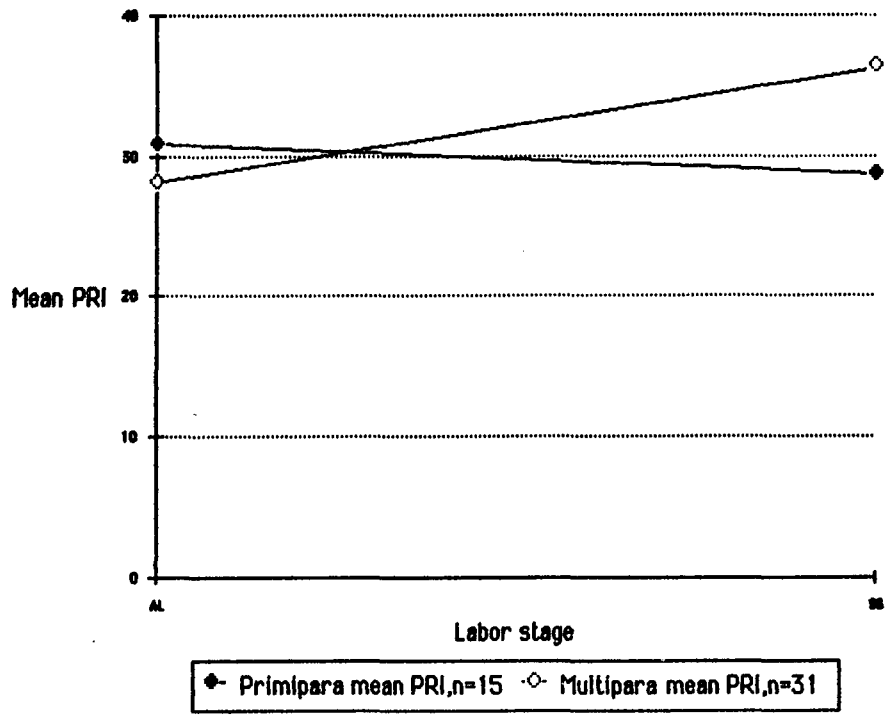

Figure 18. Primipara vs multipara PRI, AL SS.

b. Childbirth preparation and pain

The total sample was divided into three childbirth preparation categories: unprepared (n=13), Lamaze prepared (n=21), and previously Lamaze prepared (n=16). Attendance at the hospital's prenatal classes was considered childbirth preparation since the content of five of the six classes is given to preparation for labor and delivery using psychoprophylactic techniques. Several women in the Lamaze prepared group attended the hospital's prenatal classes in addition to their series of Lamaze classes. The third group were of necessity all multiparas who had taken Lamaze classes with a previous pregnancy, although some had attended a Lamaze refresher with the current pregnancy. Women were only considered in the Lamaze prepared group if they had taken the series of Lamaze classes during the current pregnancy.

A demographic and obstetrical comparison of the three childbirth preparation groups is made in Table XXVII. The Lamaze prepared group had a significantly longer second stage than either the unprepared or previously Lamaze prepared groups. This finding is not unexpected since 16 of the 21 subjects in this group were primiparas, while13 of the unprepared group were multiparas, and all of the previous Lamaze group were multiparas.

Table XXVIII presents a comparison of the three preparation groups on the subscores of the SELQ during early and active labor. A Student-Newman-Keuls (SNK) test of the group means showed that both the unprepared and Lamaze groups reported significantly higher state anxiety during early labor than the previous Lamaze group (p< .05). During early labor, the Lamaze group was also found by a SNK test to report significantly less confidence in their ability to handle labor than either the unprepared or previously Lamaze prepared groups. (The reader is reminded that Scale 1 of the SELQ is scored in the opposite direction than the confidence label would imply. A rising score on Scale 1 represents decreased confidence expressed in the ability to handle labor.) The three preparation groups did not differ on reported concern regarding the outcome of labor or fear of pain during early labor.

TABLE XXVII

DEMOGRAPHIC AND OBSTETRICAL COMPARISON OF UNPREPARED, LAMAZE PREPARED, AND PREVIOUSLY LAMAZE PREPARED GROUPS

Characteristic	Unprepared, n=13 $\bar{X}$	Lamaze, n=21 $\bar{X}$	Previous Lamaze, n=16 $\bar{X}$
Age	28.54	27.10	28.53
Infant weight[a]	3426.3	3559.0	3773.9
Apgar (1 minute)	8.25	7.67	7.93
Apgar (5 minute)	8.92	8.81	9.00
Length of labor			
First stage[b]	7.39	8.43	6.57
Second stage[c]	19.39	44.43*	15.50
Total[b]	7.75	9.29	6.94
Characteristic	**Unprepared frequency**	**Lamaze frequency**	**Previous Lamaze frequency**
Parity			
Primipara	1	16	0
Multipara	12	5	16
Method of delivery			
NSVD[d]	10	15	16
Outlet forceps	1	3	0
Assisted breech	0	1	0
Vacuum extraction	2	2	0
Medication in labor			
None	7	10	15
Analgesia only	2	5	1
Sedative only	0	1	0
Analgesia & sedative	4	2	0
PCB[e] & analgesia &/or sedative	0	3	0
Anesthesia			
Local	5	9	5
Pudendal	8	12	11
Pitocin			
None	8	15	8
Induction	1	0	4
Augmentation	4	6	4

[a]Grams.

[b]Hours.

[c]Minutes.

[d]Normal spontaneous vaginal delivery.

[e]Paracervical block.

*Significantly different by Scheffé Multiple Range Test at $p < .05$.

TABLE XXVIII

COMPARISON OF UNPREPARED, LAMAZE PREPARED, AND PREVIOUSLY LAMAZE PREPARED GROUPS ON THE FOUR SUBSCALES OF THE SELQ FOR EARLY AND ACTIVE LABOR

	Unprepared		Lamaze		Previous Lamaze			
	n	$\bar{X}$	*n*	$\bar{X}$	*n*	$\bar{X}$	F^a	*p*
Early labor								
Anxiety	7	13.14	9	14.56	10	10.2	6.47	.005*
Scale 1[b]	7	17.28	9	22.56	10	15.4	6.44	.006*
Scale 2[c]	7	2.0	9	2.78	10	2.1	2.45	.108
Scale 3[d]	7	4.0	9	4.67	10	3.1	2.55	.099
Active labor								
Anxiety	7	16.14	13	15.23	9	12.44	1.66	.209
Scale 1	7	22.86	13	25.69	9	18.22	3.08	.063
Scale 2	7	2.86	13	3.08	9	3.0	.05	.950
Scale 3	7	5.58	13	4.62	9	4.22	1.15	.333

[a]One-way analysis of variance.
[b]Confidence in ability to handle labor.
[c]Concern regarding the outcome of labor.
[d]Fear of pain in labor.
*Significant at $p < .05$.

Analysis of variance of the SELQ subscales for active labor revealed no significant differences among the group means by level of preparation.

A mixed between-within-subjects MANOVA was again used to study the effects of preparation on the in-labor PRI scores. Preparation was the three level between-subjects factor, while stage-of-labor remained the within-subjects factor. The three models advanced for this investigation were the early-active-second stage model with n=6 unprepared, n=6 Lamaze prepared, and n=8 previous Lamaze prepared; the active-transitional-second stage model with n=6, n=9, and n=8 respectively for the three levels of preparation; and the active-second stage models with n=12, n=19, and n=15. Homogeneity of variance among the groups was indicated by a nonsignificant Bartlett's test in each model studied (p> .01)

Table XXIX presents the results of the MANOVA for each of the three models. Childbirth preparation had no significant main effect on the PRI scores in any of the models considered (p= .378, p= .278, p= .106). As anticipated, the within-subjects phase-of-labor factor was significant in all models (p= .000, p= .000, p= .002). Similar to the findings in the parity analysis, a significant interaction effect was found in all models (p= .010, p= .001, p= .001). Figures 19, 20, and 21 suggest the source of the interaction in that in all three models mean scores for each preparation category as ranked from lowest to highest are rearranged in the same pattern. During active or transitional labor the means for the unprepared and previous Lamaze groups cross over from being lower than the Lamaze group in early labor, to being substantially higher than the Lamaze group in second stage. As confirmed by oneway analysis of variance (F= 3.57, p= .046) and the SNK multiple range test, during early labor the mean for the Lamaze group was significantly higher than the mean of the previously Lamaze prepared group. Although significant differences between groups were not identified for active (F= 3.08, p=.056) or transitional labor (F= .082, p=.922), a oneway ANOVA indicated a significant difference among group means for the second stage of

TABLE XXIX

PAIN RATING INDEX (PRI) MANOVAS FOR LEVEL-OF-PREPARATION AND PHASE-OF-LABOR

Model	Source of variance	*df*	*MS*	*F*	*p*
EL[a] AL[b] SS[c]	Preparation	2	199.131	1.029	.378
(*n*=6 U[e], 6 L[f], 8 P[g])	error	17	193.376		
	Phase-of-labor	2	1234.016	16.689	.000*
	Interaction	4	290.468	3.928	.010*
	error	34	73.942		
AL TL[d] SS	Preparation	2	410.386	1.367	.278
(*n*=6U, 9L, 8 P)	error	20	300.256		
	Phase-of-labor	2	571.266	12.949	.000*
	Interaction	4	258.493	5.859	.003*
	error	40	44.117		
AL SS	Preparation	2	430.648	2.370	.106
(*n*=12 U, 19 L,	error	43	181.700		
15 P)	Phase	1	736.263	10.555	.003*
	Interaction	2	545.243	7.816	.001*
	error	43	69.757		

[a]Early labor.

[b]Active labor.

[c]Second stage.

[d]Transitional labor.

[e]Unprepared.

[f]Lamaze.

[g]Previous Lamaze.

*Significant at $p < .05$

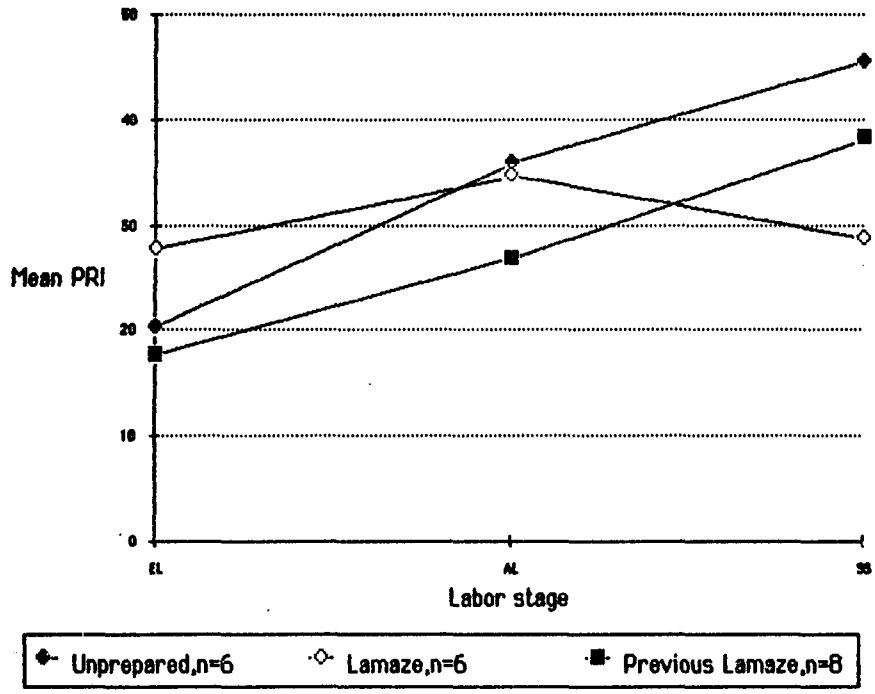

Figure 19. Unprepared vs Lamaze vs previous Lamaze, EL AL SS.

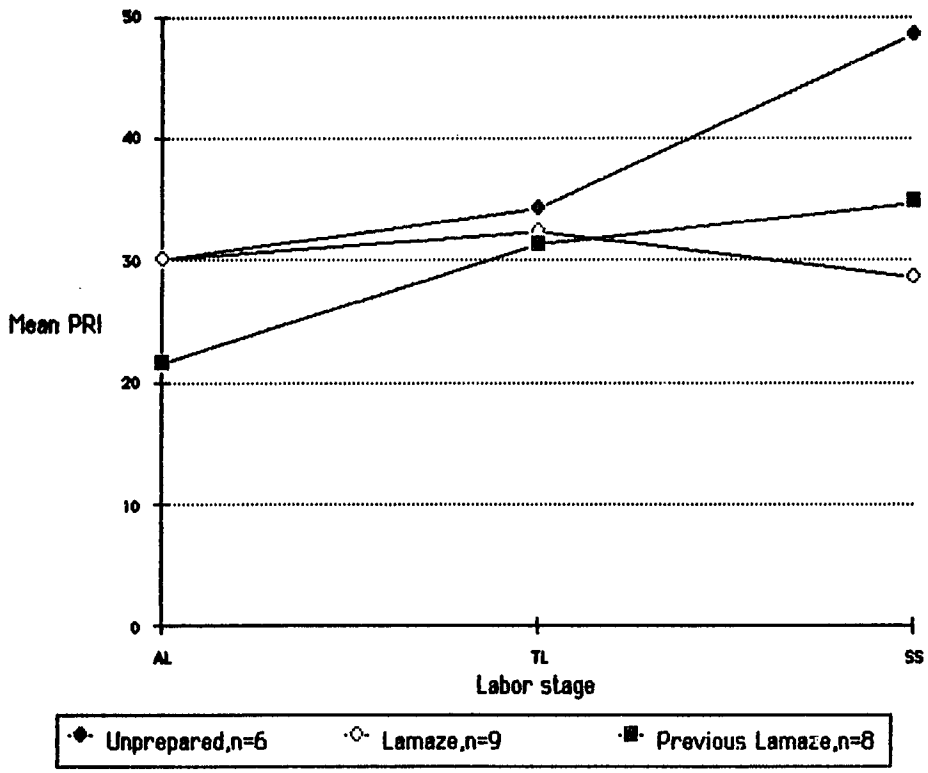

Figure 20. Unprepared vs Lamaze vs previous Lamaze, AL TL SS.

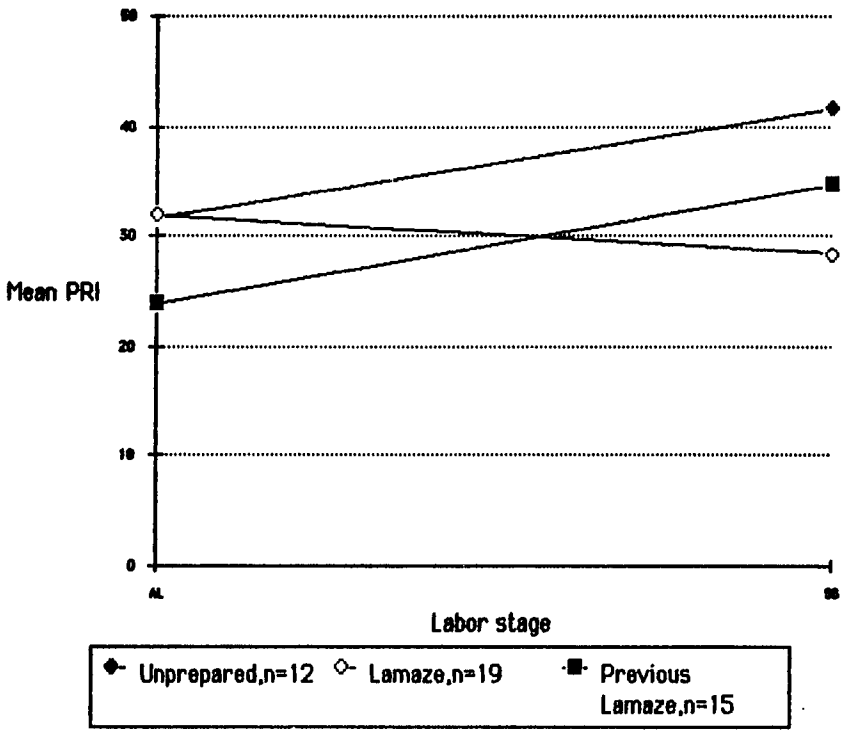

Figure 21. Unprepared vs Lamaze vs previous Lamaze, AL SS.

labor. A SNK test of the second stage data revealed that the mean for the unprepared group was significantly higher than the mean for the Lamaze prepared group.

c. Early labor pain

Twenty-four women, eight primiparas and 16 multipares, provided data during early labor. Correlation coefficients between the early labor PRI scores, childbirth preparation, parity, state anxiety, confidence in ability to handle labor, concern regarding the outcome of labor, and fear of pain are presented in Table XXX. Since in the previous analysis preparation considered at three levels was not found to have any significant effects upon the PRI scores during labor, in this and all subsequent analyses preparation was used as a two level categorical variable with the "previous Lamaze" category being collapsed into the Lamaze prepared category.

The four variables (parity, anxiety, confidence in ability to handle labor, and concern regarding the outcome of labor) found to have significant correlations with the early labor PRI scores were entered into a standard multiple regression equation. The multiple correlation for this equation was .817 which accounted for about 66.8% of the variance in the criterion variable. Examination of the beta weights in the equation showed, however, that only one variable, confidence in ability to handle labor, contributed significantly to the amount of explained variance in the pain scores ($\beta = .835$, $p = .0003$). This finding is not unexpected due to the multicollinearity reflected in the intercorrelations among the independent variables in Table XXX. Stepwise regression confirmed the importance of the confidence variable. Approximately 62% of the variance in the early labor PRI scores can be explained by this single variable.

d. Active labor pain

Table XXXI presents a correlation matrix of the active labor PRI scores, preparation, parity, and the SELQ scores as obtained during early labor. Significant

TABLE XXX

CORRELATIONS OF EARLY LABOR VARIABLES , n=23

Variable	PRI	Prepared[a]	Parity[b]	Anxiety[c]	SELQ-1[d]	SELQ-2[e]	SELQ-3[f]	Control[g]
Prepared	.2009							
Parity	-.5438*	-.2260						
Anxiety	.5157*	-.0212	-.6253*					
SELQ-1	.7907*	.1430	-.5359*	.7895*				
SELQ-2	.4379*	.2388	-.3395	.4102*	.4333*			
SELQ-3	.2994	-.0613	-.2826	.5390*	.4021*	-.1556		
Control	-.1274	.2428	.2276	-.4829*	-.2237	-.2237	-.3263*	
Enjoyment[h]	.0241	.3358	-.0350	-.1387	-.1808	-.1808	.1468	.5371*

[a]Prepared based on two levels: Unprepared (no Lamaze), or Lamaze prepared (current or previous preganancy).

[b]Parity based on two categories: primipara or multipara.

[c]State anxiety.

[d]Confidence in ability to handle labor, increasing score indicates decreased confidence.

[e]Concern regarding the outcome of labor.

[f]Fear of pain.

[g]Labor agency scale.

[h]Enjoyment Index from CEI.

*Significant at p : .05, one-tailed.

TABLE XXXI

ACTIVE LABOR PRI CORRELATIONS WITH EARLY LABOR SELQ SCORES, n=21

Variable	PRI	Prepared[a]	Parity[b]	Anxiety[c]	SELQ-1[d]	SELQ-2[e]	SELQ-3[f]
Prepared	-.1936						
Parity	-.2111	-.1061					
Anxiety	.5948*	-.2163	-.5109*				
SELQ-1	.5606*	-.0544	-.3725*	.7082*			
SELQ-2	.2790	.2712	-.2301	.2642	-.0508		
SELQ-3	.7198*	-.1962	-.2668	.6688*	.6291*	.2906	

[a]Prepared based on two levels: Unprepared (no Lamaze), or Lamaze prepared (current or previous preganancy).

[b]Parity based on two categories: primipara or multipara.

[c]State anxiety.

*Significant at $p < .05$, one-tailed.

[d]Confidence in ability to handle labor, increasing score indicates decreased confidence.

[e]Concern regarding the outcome of labor.

[f]Fear of pain.

correlations were found between the active labor PRI scores and anxiety, confidence in ability to handle labor, and fear of pain as measured during early labor. These three variables, entered into a standard multiple regression equation (R= .7279, p= .003), accounted for about 52.99% of the variance in the active labor pain scores. Forward inclusion and backward elimination procedures confirmed, however, that virtually the same proportion of variance in the active labor pain scores could be accounted for by anxiety and fear of pain as measured during early labor (R= .7271, p= .001, R^2 = .5292), while fear of pain alone was able to explain approximately 51.8% of the variance.

Correlations between the active labor PRI scores, preparation, parity, and the SELQ scores obtained during active labor are presented in Table XXXII. Significant correlations were identified between pain and the active labor measures of anxiety (r= .3240) and confidence in ability to handle labor (r= . 5447). Entering both of these variables into a regression equation produced a multiple correlation of .5597 which accounted for about 31.3% of the variance in the active labor pain scores. Again, as a result of the high intercorrelation between these two constructs (r= .7018), the single variable of confidence in ability to handle labor was able to explain 30.6% of the variance in pain (p= .002).

Correlations between the active labor PRI scores and the postpartum measures of control (Labor agency scale) and enjoyment (CEI) during the birth experience are presented in Table XXXIII. Entered into a standard regression equation control was able to explain 21% (p= .002) of the variance in active labor pain.

Finally, the most significant in-labor and postpartum measures were examined for their collective effect upon active labor pain. Fear of pain as expressed during early labor and feelings of control as expressed postpartally accounted for 61.2% of the variance of the in-labor scores. The high intercorrelation between confidence in ability to handle labor during active labor and feelings of control (r= -.7038) is reflected in that these two

TABLE XXXII

ACTIVE LABOR PRI CORRELATIONS WITH ACTIVE LABOR SELQ SCORES, n=28

Variable	PRI	Prepared[a]	Parity[b]	Anxiety[c]	SELQ-1[d]	SELQ-2[e]	SELQ-3[f]
Prepared	-.0132						
Parity	-.1460	-.3469*					
Anxiety	.3240*	-.0860	-.0971				
SELQ-1	.5447*	-.0627	-.2431	.7018*			
SELQ-2	-.0617	.0830	.0652	.5306*	.0665		
SELQ-3	.2211	-.2309	.1154	.7607*	.4829*	.3687*	

[a]Prepared based on two levels: Unprepared (no Lamaze), or Lamaze prepared (current or previous preganancy).

[b]Parity based on two categories: primipara or multipara.

[c]State anxiety.

*Significant at $p < .05$, one-tailed.

[d]Confidence in ability to handle labor, increasing score indicates decreased confidence.

[e]Concern regarding the outcome of labor

[f]Fear of pain.

TABLE XXXIII

ACTIVE LABOR PAIN RATING INDEX (PRI) CORRELATIONS WITH CONTROL AND ENJOYMENT, n=46

Variable	PRI	Control
Control[a]	-.4578*	
Enjoyment[b]	-.2073	.4454*

[a]Labor Agency Scale (LA&DAS).
[b]Enjoyment Index (CEI).
*Significant $p < .05$, one-tailed.

variables entered as independent variables explain only about 29.7% of the variance in the PRI for active labor.

e. Transitional labor pain

Correlations are presented in Tables XXXIV and XXXV between the transitional labor scores and the related variables as measured during early labor and active labor respectively. Confidence in ability to handle labor as measured during active labor was the only variable found to have a significant correlation (r= .4876) with the PRI scores for transitional labor. In a simple regression equation approximatedly 21.5% of the variance in transitional labor pain could be explained by the confidence in ability to handle labor expressed during active labor.

The postpartum measures of control and enjoyment are both significantly correlated with transitional pain as seen in Table XXXVI. Entered into a standard regression equation, control and enjoyment have a multiple correlation of .7633 with the criterion and account for about 58.2% ofthe variance in the transitional labor PRI scores. A backward elimination procedure showed, however, that feelings of control alone explained about 53.2% of the variance in transitional labor pain.

TABLE XXXIV

TRANSITIONAL LABOR PRI CORRELATIONS WITH EARLY LABOR SELQ SCORES, n=8

Variable	PRI	Prepared[a]	Parity[b]	Anxiety[c]	SELQ-1[d]	SELQ-2[e]	SELQ-3[f]
Prepared	-.2200						
Parity	.1671	-.2182					
Anxiety	.5243	-.4053	-.0204				
SELQ-1	.2814	-.1846	-.0330	.8744*			
SELQ-2	.	.	.	.	.		
SELQ-3	.4862	-.7259*	-.2037	.7467*	.4961	.	

Note: "." indicates that a coefficient cannot be computed (subsample had no variance on SELQ-2).

[a]Prepared based on two levels: Unprepared (no Lamaze), or Lamaze prepared (current or previous preganancy).

[b]Parity based on two categories: primipara or multipara.

[c]State anxiety.

*Significant at $p < .05$, one-tailed.

[d]Confidence in ability to handle labor, increasing score indicates decreasing confidence.

[e]Concern regarding the outcome of labor.

[f]Fear of pain.

TABLE XXXV

TRANSITIONAL LABOR PRI CORRELATIONS WITH ACTIVE LABOR SELQ SCORES, n=15

Variable	PRI	Prepared[a]	Parity[b]	Anxiety[c]	SELQ-1[d]	SELQ-2[e]	SELQ-3[f]
Prepared	-.0155						
Parity	-.0000	-.5774*					
Anxiety	.3260	-.0510	-.2062				
SELQ-1	.4876*	.0965	-.5271*	.6455*			
SELQ-2	.0697	-.0750	-.0865	.4942*	-.0323		
SELQ-3	.1459	-.2923*	.1500	.7009*	.4079	.1168	

[a]Prepared based on two levels: Unprepared (no Lamaze), or Lamaze prepared (current or previous preganancy).

[b]Parity based on two categories: primipara or multipara.

[c]State anxiety.

*Significant at $p < .05$, one-tailed.

[d]Confidence in ability to handle labor, increasing score indicates decreasing confidence.

[e]Concern regarding the outcome of labor.

[f]Fear of pain.

TABLE XXXVI

TRANSITIONAL LABOR PAIN RATING INDEX (PRI) CORRELATIONS WITH CONTROL AND ENJOYMENT, n=23

Variable	PRI	Control
Control[a]	-.7294*	
Enjoyment[b]	-.5260*	.4454*

[a]Labor Agency Scale (LA&DAS).
[b]Enjoyment Index (CEI).
*Significant $p < .05$, one-tailed.

f. Second stage labor pain

Early and active labor correlations with second stage pain are presented in Tables XXXVII and XXXVIII. None of the subscales of the SELQ are found to have a significant correlation with second stage pain. When considering the entire study sample (n= 50) childbirth preparation and parity are found to correlate -.3315 (p= .009) and .2784 (p= .025) respectively with second stage pain. Entered into a regression equation, these two variables account for only about 12.8% of the variance in second stage labor pain. Control during delivery and enjoyment are both significantly correlated with second stage pain as shown in Table XXXIX. Togther, these variables accounted for about 26.2% of the variance in the PRI scores for second stage. Again, the high intercorrelation between the independent variables (r= .5079) is reflected in the finding that control during delivery will alone account for 20.7% of the variance in the second stage pain scores.

TABLE XXXVII

SECOND STAGE LABOR PRI CORRELATIONS WITH EARLY LABOR SELQ SCORES, n=25

Variable	PRI	Prepared[a]	Parity[b]	Anxiety[c]	SELQ-1[d]	SELQ-2[e]	SELQ-3[f]
Prepared	-.3417*						
Parity	.2122	-.1847					
Anxiety	-.0707	-.0327	-.5941*				
SELQ-1	-.1264	.1302	-.4802*	.8107*			
SELQ-2	.1751	.2153	-.3532*	.3937*	.3942*		
SELQ-3	.0120	-.0867	-.3026	.5633*	.4271*	-.1307	

[a]Prepared based on two levels: Unprepared (no Lamaze), or Lamaze prepared (current or previous preganancy).

[b]Parity based on two categories: primipara or multipara.

[c]State anxiety.

*Significant at $p < .05$, one-tailed.

[d]Confidence in ability to handle labor, increasing score indicates decreased confidence.

[e]Concern regarding the outcome of labor.

[f]Fear of pain.

TABLE XXXVIII

SECOND STAGE LABOR PRI CORRELATIONS WITH ACTIVE LABOR SELQ SCORES, n=28

Variable	PRI	Prepared[a]	Parity[b]	Anxiety[c]	SELQ-1[d]	SELQ-2[e]	SELQ-3[f]
Prepared	-.2414						
Parity	.2528	-.3469*					
Anxiety	.1356	-.0860	-.0971				
SELQ-1	-.0469	.0627	-.2431	.7018*			
SELQ-2	.1689	-.0830	.0652	.5306*	.0665		
SELQ-3	.0848	-.2309*	.1154	.7607*	.4829*	.3687*	

[a]Prepared based on two levels: Unprepared (no Lamaze), or Lamaze prepared (current or previous preganancy).

[b]Parity based on two categories: primipara or multipara.

[c]State anxiety.

*Significant at $p < .05$, one-tailed.

[d]Confidence in ability to handle labor, increasing score indicates decreased confidence.

[e]Concern regarding the outcome of labor.

[f]Fear of pain.

TABLE XXXIX

SECOND STAGE PAIN RATING INDEX (PPI) CORRELATIONS WITH CONTROL AND ENJOYMENT, n=50

Variable	PRI	Control
Contol[a]	-.4550*	
Enjoyment[b]	-.4410*	.5079*

[a]Delivery Agency Scale (LA&DAS).
[b]Enjoyment Index (CEI).
*Significant $p < .05$, one-tailed.

3. Relationships among postpartum measures

The postpartum measures obtained by the postpartum Self-Evaluation in Labor Questionnaire, the Labor Agency and Delivery Agency Scale, and the Childbirth Experience Interview were explored for their relationships with the postpartum report of labor pain by the McGill Pain Questionnaire. Parity and preparation for childbirth were also considered for their impact upon the postpartum report of labor pain.

a. Postpartum report of early labor pain

Table XL presents the correlations between the pospartum recall of early labor pain and the other postpartum measures. Parity, anxiety, concern regarding the outcome of labor, and control were found to have significant correlations with the postpartum PRI scores for early labor. Entered into a standard regression equation (R= .6357), the four significantly correlated variables accounted for about 40.4% (adjusted R^2= .2716) of the variance in the early labor pain scores. Parity alone was, by backward elimination and stepwise procedures, found to explain 31% of the variance, and 39.5% of the variance in the postpartum report of early labor pain when combined with anxiety.

TABLE XL

POSTPARTUM EARLY LABOR PRI CORRELATIONS WITH POSTPARTUM MEASURES, n=23

Variable	PRI	Prepared[a]	Parity[b]	Anxiety[c]	SELQ-1[d]	SELQ-2[e]	SELQ-3[f]	Control[g]	Enjoy[h]	Anxiety[i]
Prepared	.0963									
Parity	-.5589*	-.2260								
Anxiety	.4296*	-.1796	-.2725							
SELQ-1	.3245	-.1902	-.2487	.7077*						
SELQ-2	.3885*	-.0645	-.3397	.7437*	.6629*					
SELQ-3	.2689	-.3527*	-.1149	.6787*	.4695*	.6312*				
Control	-.3724*	.2428	.2276	-.6524*	-.7232*	-.6382*	-.3430			
Enjoy	-.0087	.3358	-.0350	-.3236	-.3398	-.1518	-.0856	.5371*		
Anxiety (CEI)	.2768	.0168	-.0741	.6375*	.6077*	.7032*	.5777*	-.5266*	-.1008	
Pain[j]	-.2172	-.2012	.1743	.1538	.3232	-.0788	.1598	-.1628	-.3473	.1761

[a]Prepared based on two levels: Unprepared (no Lamaze), or Lamaze prepared (current or previous preganancy).
[b]Parity based on two categories: primipara or multipara.
[c]State anxiety (postpartum SELQ).
[d]Confidence in ability to handle labor (postpartum SELQ) increasing scores indicates decreased confidence.
*Significant at $p < .05$, one-tailed.
[e]Concern regarding the outcome of labor (postpartum SELQ).
[f]Fear of pain (postpartum SELQ).
[g]Labor agency scale (LA&DAS).
[h]Enjoyment Index (CEI).
[i]Anxiety Index (CEI).
[j]Pain Index (CEI).

b. Postpartum report of active labor pain

Correlations between the postpartum report of active labor pain and other postpartum measures are reported in Table XLI. Stepwise regression showed that of the five significantly correlated variables only feelings of control contributed significantly to the explanation of postpartum PRI scores for active labor (R^2 = .1946, p= .003).

c. Postpartum report of transitional labor pain

Table XLII presents the correlations between postpartum PRI scores for transitional labor and the other postpartum measures. Significant correlations were found between all the postpartum measures and transitional labor pain as reported postpartally. The large postive correlation (r= .8096, p= .000) between the transitional PRI and the Pain Index from the CEI is particularly interesting. With all the variables entered into a stepwise regression procedure, the CEI Pain Index and parity accounted for about 81.1 % (R= .9005, p= .000) of the variance in the postpartum report of transitional labor pain. The stepwise procedure was rerun using all the significant variables except the CEI Pain Index. This procedure produced an equation in which parity and confidence in ability to handle labor explained about 57.8% (R= .7602, p= .001) of the variance in the transitional PRI scores.

d. Postpartum report of second stage labor pain

Similar to the postpartum report of transitional pain, the postpartum PRI scores for second stage were significantly correlated with all of the postpartum measures except parity as shown in Table XLIII. Stepwise regression was again used to sort the variables with significant unique contributions to the report of second stage pain. The same solution was obtained whether or not the CEI Pain Index was included in the procedure. Feelings of control during delivery and fear of pain accounted for about 35.1% (R= .5932, p= .000) of the variance in the report of second stage pain. None of the other variables were found to add significantly to the amount of explained variance.

TABLE XLI

POSTPARTUM ACTIVE LABOR PRI CORRELATIONS WITH POSTPARTUM MEASURES, n=44

Variable	PRI	Prepared[a]	Parity[b]	Anxiety[c]	SELQ-1[d]	SELQ-2[e]	SELQ-3[f]	Control[g]	Enjoy[h]	Anxiety[i]
Prepared	-.0537									
Parity	-.1910	-.3328*								
Anxiety	.3520*	-.0598	-.1636							
SELQ-1	.3420*	-.0462	-.2652*	.7201*						
SELQ-2	.1201	-.2119	-.1072	.4362*	.4679*					
SELQ-3	.2373	-.3879*	.0864	.6078*	.4212*	.3959*				
Control	-.4411*	.0687	.0177	-.6229*	-.7184*	-.4176*	-.3036*			
Enjoy	-.2749*	.2331	-.2338	-.3715*	-.3209*	-.0817	-.2513*	.4062*		
Anxiety(CEI)	.2475	.0622	.0503	.5208*	.2922*	.3613*	.4280*	-.3531*	-.0574	
Pain[j]	.2797*	-.1830	.0204	.3620*	.4169*	.3560*	.3173*	-.3669*	-.2335	.2427

[a]Prepared based on two levels: Unprepared (no Lamaze), or Lamaze prepared (current or previous preganancy).
[b]Parity based on two categories: primipara or multipara.
[c]State anxiety (postpartum SELQ).
[d]Confidence in ability to handle labor (postpartum SELQ), increasing score indicates decreasing confidence.
*Significant at $p < .05$, one-tailed.
[e]Concern regarding the outcome of labor (postpartum SELQ).
[f]Fear of pain (postpartum SELQ).
[g]Labor agency scale (LA&DAS).
[h]Enjoyment Index (CEI).
[i]Anxiety Index (CEI).
[j]Pain Index (CEI).

TABLE XLII

POSTPARTUM TRANSITIONAL LABOR PRI CORRELATIONS WITH POSTPARTUM MEASURES, n=22

Variable	PRI	Prepared[a]	Parity[b]	Anxiety[c]	SELQ-1[d]	SELQ-2[e]	SELQ-3[f]	Control[g]	Enjoy[h]	Anxiety[i]
Prepared	-.4718*									
Parity	.4382*	-.4667*								
Anxiety	.3823*	-.1533	-.1815							
SELQ-1	.4502*	-.1477	-.3170	.7764*						
SELQ-2	.3767*	-.3457	-.1152	.7525*	.5899*					
SELQ-3	.4211*	-.4880*	.0325	.5849*	.4183*	.6799*				
Control	-.5783*	.1117	.0575	-.6629*	-.6478*	-.5419*	-.2765			
Enjoy	-.4479*	.2128	-.2692	-.4715*	-.5124*	-.3348	-.1914	.4392*		
Anxiety(CEI)	.4118*	-.1829	.2569	.5358*	.2335	.5261*	.5198*	-.5083*	-.2196	
Pain[j]	.8096*	-.2442	.0518	.5081*	.5998*	.5004*	.3407	-.5623*	-.3722*	.2425

[a]Prepared based on two levels: Unprepared (no Lamaze), or Lamaze prepared (current or previous preganancy).
[b]Parity based on two categories: primipara or multipara.
[c]State anxiety (postpartum SELQ).
[d]Confidence in ability to handle labor (postpartum SELQ), increasing score indicates decreasing confidence.
*Significant at $p < .05$, one-tailed.
[e]Concern regarding the outcome of labor (postpartum SELQ).
[f]Fear of pain (postpartum SELQ).
[g]Labor agency scale (LA&DAS).
[h]Enjoyment Index (CEI).
[i]Anxiety Index (CEI).
[j]Pain Index (CEI).

TABLE XLIII

POSTPARTUM SECOND STAGE PRI CORRELATIONS WITH POSTPARTUM MEASURES, n=48

Variable	PRI	Prepared[a]	Parity[b]	Anxiety[c]	SELQ-1[d]	SELQ-2[e]	SELQ-3[f]	Control[g]	Enjoy[h]	Anxiety[i]
Prepared	-.3353*									
Parity	.2002	-.3533*								
Anxiety	.3848*	.0077	-.2449*							
SELQ-1	.2586*	-.0558	-.3000*	.7007*						
SELQ-2	.2413*	-.1370	-.1976	.4979*	.4776*					
SELQ-3	.4373*	-.3588*	.0360	.6173*	.4355*	.4173*				
Control	-.4957*	.4480*	-.2990*	-.2515*	-.2240	-.3197*	-.2448*			
Enjoy	-.4479*	.2447*	-.1694	-.3162*	-.3458*	-.0919	-.2122	.5079*		
Anxiety(CEI)	.3210*	.0664	.0226	.5017*	.3019*	.3572*	.4105*	-.0513	-.0769	
Pain[j]	.4045*	-.2142	.0440	.3220*	.3952*	.3146*	.3371*	-.2674*	-.1968	.2188

[a]Prepared based on two levels: Unprepared (no Lamaze), or Lamaze prepared (current or previous preganancy).
[b]Parity based on two categories: primipara or multipara.
[c]State anxiety (postpartum SELQ).
[d]Confidence in ability to handle labor (postpartum SELQ), increasing score indicates decreased confidence.
*Significant at $p < .05$, one-tailed.
[e]Concern regarding the outcome of labor (postpartum SELQ).
[f]Fear of pain (postpartum SELQ).
[g]Delivery agency scale (LA&DAS).
[h]Enjoyment Index (CEI).
[i]Anxiety Index (CEI).
[j]Pain Index (CEI).

D. Relationships between pain report during labor and physiologic variables

Mean arterial pressure (MAP) was computed as the sum of the diastolic blood pressure and one-third of the pulse pressure (Novak et al., 1985). The correlations between the PRI scores and the physiologic variables are reported in Table XLIV on the basis of 88 reports during the first stage of labor. Cervical dilatation and frequency of uterine contractions were found to have significant correlations with the in-labor report of pain, .2332 (p= .014) and -.3038 (p= .002) respectively. Entered into a standard multiple regression equation these two variables accounted for about 11.7% (R= .3424, p= .004) of the variance in the PRI scores for the first stage of labor.

TABLE XLIV

IN-LABOR PAIN RATING INDEX (PRI) CORRELATIONS WITH PHYSIOLOGIC PARAMETERS, n=88

Physiologic parameters	PRI	MAP[a]	Pulse rate	Cervical dilatation
MAP	.0642			
Pulse	.0337	-.1023		
Dilatation	.2332*	.1376	.0444	
Contraction frequency[b]	-.3038*	-.1478	.0849	-.3768*

[a]Mean arterial pressure.

[b]Contraction frequency measured from the beginning of one contraction to the beginning of the subsequent contraction, a decreasing number indicates an increasing frequency of contractions.

*Significant p< .05, one-tailed.

V. SUMMARY, DISCUSSION, IMPLICATIONS, AND CONCLUSIONS

A. Summary

This non-experimental field study was conducted to investigate the reliability and validity of the postpartum report of labor pain and to study the ex post facto relationships among pain and a number of antecedant, intervening, and labor related phenomena. Fifty women provided data during the various phases of labor and the postpartum hospitalization on the McGill Pain Questionnaire, the Self-Evaluation in Labor Questionnaire, the Labor Agency and Delivery Agency Scales, and the Childbirth Experience Interview. Additional demographic, obstetrical, and physiological data were obtained.

The first hypothesis, self-report postpartum pain intensity scores will not differ from self-report pain intensity scores obtained during labor, was not supported. Following square root data transformation, the postpartum pain intensity scores (PPI) were found to be significantly different than the in-labor intensity scores in the early-active-second stage model and the active-second stage model; there were no significant differences between in-labor and postpartum pain intensity in the early-active-transitional-second stage or the active-transitional-second stage models. In the two models in which significant differences existed, the postpartum means of early and active labor pain were found to be significantly lower than the in-labor means.

The second hypothesis was supported: no significant differences were found between in-labor and postpartum pain ratings (PRI) in any of the four phase-of-labor models analyzed, before or after square root data transformation.

The third hypothesis was not supported: parity had no significant main effect on the report of pain during labor. A significant interaction effect was found, however, which was identified as less pain reported by multiparas than primiparas during early labor and more pain reported by multiparas than primiparas during the second stage.

Hypothesis four, parturients prepared for childbirth through Lamaze classes will report less pain during labor than unprepared parturients, was not supported. Childbirth preparation, defined as unprepared, Lamaze prepared, or previously Lamaze prepared, had no significant main effect on pain. Similar to parity, a significant interaction effect with phase of labor was identified. During early labor, Lamaze prepared women reported more pain than previously Lamaze prepared women, while in second stage unprepared women reported more pain than the Lamaze prepared women.

Support for hypothesis five, anxiety will be positively associated with pain scores obtained during labor and postpartum, was equivocal. State anxiety had a significant positive correlation with in-labor pain scores during early and active labor. No significant correlations were found between anxiety and pain as reported during transitional or second stage labor. Postpartally, significant positive correlations were found between anxiety and pain for all phases of labor: early, active, transitional, and second stage.

Hypothesis six, fear of pain will be positively associated with pain scores obtained during labor and postpartum, was not supported. Fear of pain, as measured during early labor, was significantly correlated with in-labor pain only during active labor. When measured during active labor, fear of pain showed no significant correlations with pain at any phase of labor. Postpartally, fear of pain and pain reported for transitional and second stage labor were positively correlated.

Although all relationships were in the direction postulated in hypothesis seven, feelings of control will be negatively associated with pain scores obtained during labor and postpartum, a significant negative correlation was not found between feelings of control and the in-labor report of early labor pain. Significant negative correlations were found between feelings of control and pain for all other data points: in-labor report for active, transitional, and second stage labor; and postpartum report for early, active, transitional, and second stage labor.

Hypothesis eight, enjoyment will be negatively associated with pain scores obtained during labor and postpartum, was not supported since birth enjoyment did not show a consistent relationship with pain report. A significant relationship was not found between enjoyment and pain for early or active labor as reported during labor or for early labor as reported pospartum. For the in-labor data, a significant negative correlation was found between enjoyment and pain for transitional, and second stage labor; and for the postpartum data enjoyment and pain were significantly related for active, transitional, and second stage.

The reliability of postpartum pain recall was not affected by parity or childbirth preparation as postulated in hypothesis nine. Differences between in-labor and postpartum report on the PPI for the early-active-second stage model were no longer present when state anxiety was controlled. PPI differences observed in the active-second stage model were eliminated when anxiety, fear of pain, or feelings of control during labor were controlled. Birth enjoyment had no effect on the reliability of postpartum pain recall.

Hypotheses ten, cervical dilatation will be positively associated with self-report of pain during labor, and eleven, increased frequency of uterine contractions will be positively associated with pain report during labor, were supported. Significant positive relationships were found between pain reported during the first stage of labor and cervical dilatation and frequency of uterine contractions.

There was no support for the twelfth or thirteenth hypothesis: significant relationships were not identified between in-labor pain report and mean arterial blood pressure or heart rate.

Additional analysis explored the convergent and discriminant validity of the pain and anxiety measures and the relationships among variables in predicting labor pain. A discussion of the findings and implications for research follows.

B. Discussion

1. Sample characteristics

The 50 women who served as subjects for the study were a convenience sample from one community hospital. All subjects were married and all, but one, were caucasian. The women were as a group highly educated with only three reporting less than high school graduation, 58% reporting at least some college, and 38% reporting college graduation or higher.

The sample was specifically chosen for its low-risk characteristics with five subjects being eliminated from the study because they developed complications of maternal or fetal status during labor. Included in the sample were five multiparas who had intravenous pitocin induction of labor and 14 subjects who had pitocin augmentation during the first stage of labor. Pitocin administration produced no significant effect on the pain scores reported by the subjects.

The obstetric features of the sample approximated published norms when compared with values from a commonly used obstetric text (Pritchard & MacDonald, 1980). The mean length of the first stage of labor was somewhat longer than average for both nulliparas, 10.04 hours compared to 8 hours, and multiparas, 6.29 hours compared to 5 hours. Pritchard and MacDonald report the median duration of second stage as 50 minutes in nulliparas and 20 minutes in multiparas. Therefore, the nulliparas in the sample had a slightly longer second stage (median 55 minutes), while the multiparas had a substantially shorter second stage (median 11 minutes). This short second stage for multiparas may be due in part to the liberal use of episiotomy apparent in the 94% episiotomy rate for the entire sample.

The mean birth weight of 3567 grams for infants of the nulliparas and 3607 grams for the infants of the multiparas was somewhat higher than the 3390 grams reported by Pritchard and MacDonald for white term infants in the United States. The higher birth weight may reflect the overall higher than average socioeconomic status of this select sample.

2. Reliability of postpartum recall of labor pain

As suggested by previous investigators (Melzack et al., 1981; 1984; Niven & Gijsbers, 1984), the McGill Pain Questionnaire was found to be a tool amenable to the measurement of parturition pain. Parturients responded favorably to administration of the tool, and were usually able to answer all items on the questionnaire in the interval between two uterine contractions until late in the first stage of labor. When the refractory period between contractions became less than one minute, many women were unable to reorient themselves sufficiently before the onset of the next contraction to respond to the questionnaire. A few parturients were remarkably able to quickly reorient and respond to the questionnaire items even during very brief intervals between contractions.

Contrary to the conclusions of Niven and Gijsbers (1984), the study data suggested that overall the postpartum recall of the pain of labor was highly reliable. Women were able to postpartally recall the different phases of labor and distinguish variations in the pain experienced. Differences were found, however, between the PPI and PRI in their relative strength of postpartum reliability. Following square root data transformation, postpartum PPI scores were significantly different than their in-labor counterparts in both the early-active-second stage model (n= 20) and the active-second stage model (n= 46). In the former model the early labor PPI scores were found to be significantly lower pospartum, while in the latter model the active labor PPI was devalued postpartally. No such differences were found for the PRI scores. In all phase-of-labor models, there was no significant main effect for the time-of-report factor on the PRI scores.

It is instructive to note the high degree of convergence in the second stage data of the postpartum means with the in-labor means on both the PPI and the PRI. One explanation may be that the intensity and productivity of the second stage of labor during which many women report increased awareness results in enhanced imprinting of details and recall of this stage of

labor. In the current study, however, procedural methodology may be a factor in the degree of observed congruence since the in-labor report was in reality also a retrospective report of second stage pain. The high degree of reliability suggested by the data for the recall of second stage pain may therefore represent an overestimate due to the research procedures. Additional research is indicated to investigate the congruence between pain data obtained during the actual course of the second stage and postpartum recall.

The apparent difference in reliability of the PPI as compared to the PRI may be the inherent difference between a unidimensional as opposed to a multidimensional measurement strategy. As a single, ordinal rating scale of overall pain intensity, the PPI suffers from a lack of sensitivity. Commonly used in clinical studies of pain, ordinal scales force the endless variety of qualities which consitute pain into a single linguistic or numerical label with extremely limited gradations. As expressed by Reading, "requiring patients to use a single scale ignores the possibility that over repeated trials, the scale may be used to reflect different components of their pain experience" (1983, p. 417). Such may be the case with the PPI as a method to measure retrospectively the experience of pain during labor. As the graphic depictions in Figures 6, 7, 8, and 9 would suggest, when a subject is asked to retrospectively report her pain on a single ordinal scale of overall intensity, comparisons with subsequent pain during labor may be likely to occur. In fact, when presented with the PPI postpartally and asked to rate the pain felt at a given time in early or active labor, a number of women remarked that, while at the time they thought the pain was very severe, it actually was not so bad when compared with the pain they experienced later in labor. On the other hand, because the PRI allows the individual to concentrate on more discrete components of their pain experience and provides a wide number of response choices, overt comparisons during retrospective report may be less likely to occur.

As a further evaluation of the reliability of the PRI, separate repeated measures MANOVA procedures were performed on each subscale. As reported in Table XLV, no

TABLE XLV

COMPARISONS OF MANOVAS FOR PAIN RATING INDEX (PRI) AND PRI SUBSCALES

Model	PRI		SENSORY		AFFECTIVE		EVALUATIVE		MISCELLANEOUS	
	F	*p*	*F*	*p*	*F*	*p*	*F*	*p*	*F*	*p*
EL AL TL SS (*n*=6)										
Time/recall[a]	.11	.753	.22	.660	1.18	.328	2.47	.177	.12	.748
Phase[b]	11.89	.002*	9.28	.001*	9.87	.001*	11.83	.000*	12.76	.000*
Interaction	2.41	.108	2.49	.100	.92	.456	1.48	.260	3.55	.040*
EL AL SS (*n*=20)										
Time/recall	.97	.337	2.39	.139	.38	.562	2.97	.101	.17	.688
Phase	22.69	.000*	12.97	.000*	18.45	.000*	10.90	.000*	31.32	.000*
Interaction	2.51	.095	2.59	.088	.44	.649	.52	.600	.54	.586
AL TL SS (*n*=23)										
Time/recall	.60	.446	.00	.975	2.76	.111	1.19	.287	2.89	.103
Phase	11.56	.000*	6.26	.004*	11.85	.000*	17.83	.000*	9.29	.000*
Interaction	4.89	.012*	3.28	.047*	2.37	.106	3.62	.035*	3.08	.056
AL SS (*n*=46)										
Time/recall	.03	.855	.90	.348	2.60	.114	.57	.456	2.09	.155
Phase	9.31	.004*	3.91	.054	11.92	.001*	16.13	.000*	8.89	.005*
Interaction	3.12	.084	2.88	.097	2.21	.144	.83	.368	1.77	.191

[a]Time-of-report factor.

[b]Phase-of-labor factor.

*Significant at $p < .05$.

significant main effect for the recall factor was identified for any of the subscales suggesting that the sensory, affective, and evaluative dimensions of parturition pain were not subject to differential recall by the participants. The significant interaction effect between recall and phase-of-labor found in the active-transitional-second stage model for the PRI was also found for the sensory and evaluative subscales. Prevously identified as a tendency of the participants to postpartally inflate the PRI for the transitional phase of labor, the subscale findings suggest that, in retrospect, the intensity of the physical forces operating during transition may be reflected in inflated sensory scores. Additionally, as postpartally viewed from the totality of the labor and delivery experience, more intense evaluative words may be chosen to describe the transition experience. Additional investigation into the phenomena of transitional labor and its integration into the total labor and delivery experience is needed to identify the generalizability of these findings.

As a further exploration of the reliability of postpartum recall of parturition pain, comparisons were made between the frequencies of words chosen on the PRI during labor and postpartum for each phase of labor. As reported in Table XLVI a high degree of reliability is reflected in the words chosen on postpartum report when compared to the in-labor frequencies.

3. Descriptive characteristics of parturition pain

A comparison of the 96 observations recorded during the first stage of labor in the current study with 141 observations reported by Melzack et al. (1981), showed that four words from the sensory subclass reported by 33% or more of the women in both samples are the same: sharp, cramping, throbbing, and stabbing. In the current sample, taut was also chosen from the sensory subclass by over 33% of the women, while aching, hot, shooting, and heavy were also chosen in the sample reported by Melzack et al. In the affective subclass, tiring was the most frequent word chosen in both samples, although exhausting was also reported by 36% of the respondents in the Melzack et al. study. Identical words were most

TABLE XLVI

QUALITIES OF LABOR PAIN, PRI WORDS CHOSEN BY 33% OR MORE OF THE RESPONDENTS FOR EACH PHASE OF LABOR

Labor phase	Word class	In-Labor Word	In-Labor %	Postpartum Word	Postpartum %
Early labor (n= 24)	Sensory	Cramping	54	Cramping	50
		Sharp	54	(Sharp	13)
		Taut	46	Taut	38
		Throbbing	33	(Throbbing	13)
		Pressing	33	(Pressing	25)
	Affective	Tiring	42	Tiring	46
	Evaluative	(No words chosen by 33% or more)			
	Misc.	Tight	54	Tight	63
		(Nagging	21)	Nagging	42
Active labor (n= 46)	Sensory	Sharp	65	Sharp	48
		Cramping	52	Cramping	39
		Throbbing	43	(Throbbing	28)
		Stabbing	41	(Stabbing	30)
		Taut	35	(Taut	28)
	Affective	Tiring	39	Tiring	41
	Evaluative	Intense	41	Intense	35
	Misc.	(No words chosen by 33% or more)			

TABLE XLVI (continued)

QUALITIES OF LABOR PAIN, PRI WORDS CHOSEN BY 33% OR MORE OF THE RESPONDENTS FOR EACH PHASE OF LABOR

Labor phase	Word class	In-Labor		Postpartum	
		Word	%	Word	%
Transition (n= 23)	Sensory	Sharp	83	Sharp	39
		Shooting	57	Shooting	48
		Cramping	52	Cramping	52
		Stabbing	43	Stabbing	35
		Throbbing	39	Throbbing	35
		Hot	39	(Hot	26)
		Heavy	39	Heavy	52
		(Wrenching	26)	Wrenching	57
		(Splitting	17)	Splitting	48
	Affective	Tiring	48	Tiring	48
		Exhausting	35	Exhausting	52
	Evaluative	Intense	57	Intense	57
	Misc.	Tight	52	(Tight	30)
		Piercing	35	Piercing	48
		(Agonizing	22)	Agonizing	35
Second stage (n= 50)	Sensory	Splitting	48	Splitting	54
		Heavy	38	Heavy	56
		Pressing	36	Pressing	36
		Pounding	34	(Pounding	24)
		(Wrenching	32)	Wrenching	42
		(Sharp	30)	Sharp	38
	Affective	Exhausting	50	Exhausting	58
	Evaluative	Intense	62	Intense	50
	Misc.	Agonizing	36	(Agonizing	24)
		(Tearing	26)	Tearing	34

frequently reported in both samples for the evaluative and miscellaneous subclasses: intense and tight respectively. Also in keeping with the findings of Melzack et al. that more than 80% of the women chose a word from the affective subclass (i.e., tiring or exhausting), was the choice of one of these words by 68% of the current sample.

Further analysis of the subscales of the PRI to explore differential features of the pain of parturition was not pursued due to the recent report indicating that the PRI subscales do not display discriminant validity (Turk, Rudy, & Salovery, 1985). In a study using comfirmatory factor analysis with data from two distinct subject populations, these investigators found strong statistical support for the theoretical factor structure of the sensory, affective, and evaluative dimensions from which the PRI was developed by Melzack and Torgerson (1971). However, the distinctiveness of the subscales was not supported by the data since the average correlations within subclasses was smaller, in both samples, than the average correlations between subclasses. The investigators concluded that since the three PRI subscales do not display discriminant validity ". . . no uniqueness or distinctiveness in terms of pain assessment can be attributed to the individual subscale scores. . . the use of separate subscale scores is inappropriate because they are, in reality, measuring the same construct" (p. 393).

Turk et al. have also criticized the failure of investigators to report alpha coefficients for the PRI as measures of internal consistency in reliability evaluations of the MPQ. If the PRI is more correctly used as a single scale of pain, then alpha coefficients are most appropriate as an assessment of the reliability of the scale. Table XLVII presents alpha coefficients computed from the study data for each data point. Ranging from .7456 for the in-labor data of active labor to .8904 for the postpartum data of second stage, the coefficients indicate a high degree of reliability for the PRI.

TABLE XLVII

PAIN RATING INDEX (PRI) ALPHA COEFFICIENTS FOR EACH DATA POINT

Data point	*n*	In-labor	Postpartum
Early labor	24	.7538	.7576
Active labor	46	.7456	.8520
Transitional labor	23	.8291	.8859
Second stage	50	.7985	.8904

4. Effects of selected variables on pain report

The postpartum recall of parturition pain was found to be significantly different than in-labor report on the PPI for the early-active-second stage and the active-second stage models. Analysis of covariance demonstrated that state anxiety may serve as one mediator of the difference observed between the in-labor and postpartal scores on the PPI. The significant positive correlations found between state anxiety and pain during early and active labor (the labor phases in which postpartum report was found to be significantly different than in-labor report) suggest that, on an ordinal scale of pain intensity, postpartum recall of labor pain may not represent the same interplay of factors as occurred during the actual process of labor.

More critical to the report of pain for the active phase of labor were fear of pain and feelings of control. When these variables were controlled, differences no longer were found between in-labor and postpartal report on the PPI in the active-second stage model. Fear of pain, which in the face of continuing pain during the actual course of labor may increase the perception of pain, may affect the postpartum recall of labor pain in a differential manner. In fact, comparisons between correlations of in-labor variables and post-partum variables, suggest that fear of pain, as measured during labor, is related most significantly to the report

of pain during active labor and, as measured postpartally, is related most significantly to the report of pain for transitional and second stage labor. Although a similar pattern of interaction with the time of pain report may exist for feelings of control, in this study the impact of this construct remains speculative since feelings of control were only measured postpartally. One explanation may be that the more control a woman feels she was able to maintain during labor and delivery the less severe may be her evaluation of pain intensity when labor is considered retrospectively.

Although postpartum recall of labor pain was only found to differ significantly in two of the four labor phase models analyzed, the relationships identified with state anxiety, fear of pain, and feelings of control suggest a need for caution in the interpretation of data utilizing an overall ordinal measure of pain for the retrospective study of the labor experience. Postpartum report on a ordinal scale may tend to devaluate the pain of early and possibly active labor and be influenced by state anxiety, fear of pain, or feelings of control during labor.

5. Convergent and discriminant validity of measures

Pain and anxiety, two features of the childbirth experience frequently studied, were examined using the postpartum data for the strength of their convergent and discriminant validity. Postpartum data were chosen for this analysis in order to meet as closely as possible the requirements for the construction of a multitrait-multimethod matrix and to reflect the timing of data collection most frequently reported in the literature. Similar to the measurement of childbirth pain previously discussed, anxiety during labor and delivery has been measured retrospectively on ordinal scales (Areskog et al., 1982; Bergström-Walan, 1963; Davenport-Slack & Boylan, 1974; Nettlebladt el al., 1976; Uddenberg, 1979) and computed from a structured interview (Charles et al., 1978; Norr et al., 1977). These retrospective anxiety measures have been obtained from within the first hour to several weeks postpartum.

In considering the results of the multitrait-multimethod analysis it must be remembered that very artificial scores were computed for the MPQ using a summing of the PPI and PRI and averaging the summed scores across two to four phases of labor. This technique is not recommended by developers of the MPQ, nor does it appear in the literature. In defense of the mathematics, however, was the attempt to reflect retrospectively, using a well-accepted pain measurement instrument, a composite pain measure for the labor and delivery experience. A composite or overall assessment of labor and delivery pain has most often appeared in the childbirth literature.

An adaptation of an existing instrument was also used to measure anxiety in the rewording of the SELQ to the past-tense and asking women to repond to the inventory as an overall assessment of their feelings during the labor and birth. Several of the subjects remarked that they found it difficult to repond to the SELQ items overall, suggesting that their feelings were not static over the course of labor and hence difficult to rate on an overall index.

The pattern of multitrait-multimethod intercorrelations identified in Table XVI for pain and anxiety suggest a need for concern regarding the validity of the measures chosen for study. Excessive common method variance between the questionnaire methods for pain and anxiety and insufficient common factor variance between the two measures of each construct merit additional investigation.

It may be that the seeming lack of convergent validity of the pain and anxiety measures is partially a result of inherent differences in the precise construct being measured by the two methods. The MPQ and the 6-item state anxiety scale on the SELQ are both general measures applicable to pain and anxiety in any clinical setting. On the other hand, the Pain and Anxiety Indices taken from the CEI are measures obtained solely within the context of the labor and delivery experience. The interview schedule is designed to tap, through both open-ended and ordinal scale items, the experience of labor and delivery. The Pain Index obtained, therefore, deals more with the relative importance of pain to the woman within the total

experience of childbirth rather than with the specifics of the pain itself; while the Anxiety Index deals more with specific conscious concerns a woman had during labor and delivery rather than general feelings of anxiety. These conceptual differences in the constructs measured may be the primary cause of the failure to establish the convergent validity of the pain and anxiety measures. Whatever the mechanism, however, of the relatively poor results of the multitrait-muiltimethod matrix, the data emphasize the need for more precise delineation of constructs and investigation into the psychometric properties of the instruments chosen.

6. Relationships between pain and selected antecedent, intervening and labor-related variables

First pregnancy has been associated with the report of increased parturition pain (Cogan 1974; Melzack et al., 1981; Niven & Gijsbers, 1984; Norr et al., 1977; Winsberg & Greenlick, 1967). In the current study, although no significant main effect for parity was identified across the phases of labor, primiparas reported more severe pain than multiparas during early labor, but less severe pain during second stage. Methodological differences between the two previous studies using the MPQ during labor (Melzack et al., 1981; Niven & Gijsbers, 1984) and the current study provide a possible explanation for the apparent discrepancy of findings. In both previous studies, pain was measured once for each subject atrandom points during the progress of labor after at least two centimeters (Melzack et al., 1981) or four centimeters (Niven & Gijsbers, 1984) cervical dilatation. Comparisons were made, therefore, between primiparas and multiparas for the first stage of labor as a whole with no control for the particular phase of the first stage during which pain report was obtained. Second stage pain was not measured in either study. The data of the current study suggest that the phase of labor during which pain is reported may be an important factor in differential report between primiparas and multiparas.

The increased pain reported during early labor by primiparas may be associated with a more well-established contraction pattern in early labor and increased duration of early labor usually encountered in a woman's first labor. Increased state anxiety and decreased confidence in ability to handle labor expressed by the primiparas during early labor must also be considered as primary factors influencing pain perception and report. The pattern of pain report by primiparas illustrated in Figures 16, 17, and 18 suggests that pain is relatively great for primiparas early in labor but increases only moderately throughout the progression of the first stage and decreases during second stage. In contrast, multiparas report much less pain in early labor but their pain report increases dramatically in active and transitional labor reaching its peak during the second stage of labor. This finding is in sharp contrast to that of Cogan (1974) whose study comparing postpartum pain report in 16 prepared primiparas and 16 prepared multiparas showed transition to be the period of highest pain in both groups. More rapid and abrupt fetal descent accounting for the shortened second stage observed in multiparas may explain the increased severity of pain reported by multiparas than primiparas. The gradual fetal descent usually seen in a first labor allows more time for progressive distention of pelvic structures and the development of the natural anesthesia of perineal tissues caused by prolonged pressure.

The significant predictors identified for the different phases of labor suggest that, whereas psychological variables are critical in explaining individual differences in pain during early and active labor, the import of these factors lessens as labor progresses. The explanation of more than 60% of the variance in early labor pain by expressed confidence in ability to handle labor and the decreased confidence expressed by primiparas, even after Lamaze childbirth preparation, points to the significant nature of the "unknown" quality of labor pain. Interestingly, as labor progressed, the impact of confidence in ability to handle labor diminished in that its explanation of the variance in pain decreased to just over 30% during active labor, and slightly more than 21% during transitional labor. In addition, by

active labor a difference in expressed confidence was no longer apparent between primiparas and multiparas. The direction and magnitude of change in the mean for confidence in primiparas and multiparas suggest that both groups express less confidence as labor progresses in their ability to handle labor, but the loss in confidence is greater for multiparas. The more mild, irregular nature of early labor in multiparas and a decreased level of anxiety because they have given birth before may be factors contributing to the increased confidence expressed during early labor. However, during active labor, when multiparas are faced with a labor pattern more nearly similar to that experienced by primiparas, the sudden reality of labor may precipiate a more negative evaluation of confidence in ability to handle labor than occurs during a first labor.

In contrast to a number of previous studies (Astbury, 1980; Beck et al., 1980; Guiffre, 1983; Nettelbladt et al., 1976), state anxiety did not emerge from the data as a significant contributor to the variance of pain during labor. A likely explanation is that, although anxiety had a significant positive association with early and active labor pain in the current study, when analyzed with variables more specific to labor, such as confidence in ability to handle labor and fear of pain, the impact of anxiety was mediated through the related variables. Identification of the specific labor related anxieties responsible for increased state anxiety during labor will assist in the development and validation of interventions to modify the impact of anxiety on pain during labor.

Fear of pain expressed during early labor also emerged as a significant predictor of active labor pain explaining over 50% of the variance. The greater fear expressed by primiparas, although not significantly greater, may be again associated with the unknown nature of parturition pain. Previous investigation (Niven & Gijsbers, 1984) found a strong association between previous pain experiences and lower levels of pain in childbirth. Although previous pain experience was not measured in the current study, women without

significant experience with pain may express increased apprehension and fear of pain leading to enhanced pain perception.

State anxiety, fear of pain, or expressed confidence in ability to handle labor did not contribute to the explanation of individual differences in second stage pain. Of the variables measured during labor, childbirth preparation, defined as unprepared or Lamaze prepared, was the only significant predictor of second stage pain explaining just over 10% of the variance.

The results of this study emphasize that postpartal measurement does not necessarily represent the same picture of reality as reflected by in-labor measurement. Although women were able to selectively report pain for the various phases of labor in a very reliable manner postpartally on the PRI, the high intercorrelations among all variables for transitional and second stage labor evident in the postpartum data suggest that retrospective report may be dominated by the events of the more intense and rewarding phases of the labor and delivery process. This is not to suggest that in-labor data is more "accurate" than postpartum data, but rather that the two are measuring somewhat different phenomena even though identical instrumentation may be used. The dynamic interaction of subtle variations in state anxiety, confidence, and fear as labor progresses cannot be duplicated by postpartal measures rating overall perceptions of these same constructs.

The strong relationship identified between postpartal feelings of control during labor and delivery and pain during active, transitional, and second stage labor, and a corresponding association with expressed enjoyment lend additional support to the central role of mastery in childbirth satisfaction hypothesized by Humenick and Bugen (1981). Feelings of control were not associated with decreased pain during early labor, but emerged as important as labor progressed having their greatest impact on pain reported during the transitional phase of labor when the maintenance of control is commonly most difficult.

7. Relationship with physiologic measures

As predicted, increased cervical dilatation and frequency of contractions were positively associated with higher pain scores confirming the findings of previous investigators (Giuffre, 1983; Melzack et al., 1984). These data support a model of childbirth in which physical as well as psychosocial variables are important to the perception of pain. The failure to identify significant relationships between MAP, heart rate and pain may be primarily due to the inability of these rather gross systemic measures to identify subtle autonomic responses due to increased pain and/or anxiety. Variations in the mean arterial pressure and maternal heart rate with each cycle of uterine contraction are well established (Cibils, 1981) and may mitigate the usefulness of isolated measures. The dynamics of parturition physiology may require more invasive monitoring of cardiac and hemodynamic changes plus ongoing evaluation of endogenous catecholamines to establish clear relationships between percieved pain and the stress response.

C. Collecting and analyzing data pertaining to the pain of parturition

A number of theoretical and practical problems related to the study of the pain of parturition were suggested by this study. An initial difficulty is the potential bias created by repeatedly questionning the parturient about any pain she is experiencing. Does this questionning produce, as some would suggest, the expectation of pain resulting in increased anxiety and perception of otherwise unpainful sensations as painful? A longstanding paradigm which has resulted in the virtual nonexistence of the word pain in the vocabulary of many childbirth educators and practitioners, the investigator does not accept such a simplistic model that merely asking a woman about pain results in enhanced or unrealistic pain perception. There is ample evidence for the physiologic origin of nociceptive stimuli during labor and a historical plethora of data to suggest that parturition usually involves some pain. If the acknowledgement of pain did result in enhanced pain perception, such an effect might be theoretically expected to occur with more intensity in nulliparous parturients. Such was not

the finding in the current study. In fact, as a group the primiparous women reported only a slight increase in pain as labor progressed and a decrease in pain during the second stage of labor.

The bias of repeated measurements of pain during labor affecting the postpartum data collected must however be acknowledged. The degree to which the postpartum responses of the women were primed by their in-labor responses cannot of course be evaluated but is a potentially confounding factor in the postpartum data. It seems reasonable to suggest that the apparent validity of the postpartum measures found in this study is somewhat inflated due to practice and memory. The repeated measures of pain cannot be assumed to have been independent of each other which may have resulted in an inflation of their congruence.

A major difficulty in the study design is the conceptual difference between a construct measured at a given point in time during its occurrence versus a retrospective measurement that is affected by the whole of the phenomenon even though a discrete point is being recalled. Can retrospective report of a process such as labor be expected to be more or less than an overall remembrance of the construct? The remarkable convergence of the postpartum variables in transitional and second stage labor suggests that postpartum measures of labor constructs are indeed not the same phenomena as occur during the actual process of labor and delivery.

A very practical problem lies is the actual collection of second stage data. The intense work of second stage coupled with the family orientation of the birth environment present obstacles to data collection that may be real or imagined. A shorter version of the MPQ or a measure of intensity such as a visual analogue may provide measurement operations for pain during the second stage which would seem less obtrusive in the birthing environment.

A final problem in the study of parturition pain is the difficulty of repeated measures analysis. In the classic repeated measures desgin the observations should be equally spaced in time which was not the case in the current study. Although based on empirical models of the

physiology of labor, the division of the first stage of labor into early, active, and transitional phases on the basis of cervical dilatation remains somewhat arbitrary. The data for each phase of labor does not represent a given point in time or a relative point in the progression of labor but rather a range of points within a theoretically derived division of a continuous process of dynamic physiologic events. A more complete assessment of comparable points in labor would consider frequency and intensity of uterine contractions as well as fetal position and rate of fetal descent. Our abilities to understand the complexities of the wide individual variations in the perceptual experience of childbirth is indeed impaired by the limitations of quantification.

D. Implications for research

A primary implication of this study is the need for researchers to reevaluate the assumed validity of postpartum measurement of parturition pain on an ordinal scale. When relationships of variables are being examined across the phases of labor, an ordinal pain scale may be especially unreliable for the retrospective evaluation of pain intensity experienced during early and active labor. If retrospective report must be used, a multidimensional scale such as the Pain Rating Index, may provide data that are more sensitive and reflective of the progression of the labor and delivery experience.

Since retrospective report of the labor and delivery experience may cause all related variables to be highly intercorrelated around the intensity of late first stage and the second stage of labor, investigators must choose the time of measurement based upon the research question to be answered by the data. The experience of labor and delivery as perceived during the early postpartum period may not provide the same correlates of the experience as occur during the actual process of parturition. A retrospective view of labor and delivery cannot be expected to represent the prospective view parturients would report during the actual experience. Further research is indicated to identify the relationships between constructs measured during labor and related or theoretically identical constructs measured postpartally. Additionally, the impact of time spent in labor on postpartum measures merits investigation.

Does the primipara report more pain on a global postpartum measure because she was in labor for a longer period of time rather than having more intense pain during any one phase of labor?

The study findings suggest that overall, postpartal ratings of pain and anxiety experienced during labor and delivery are more reflective of feelings experienced during the late first stage and second stage of labor. Researchers must carefully evaluate the lack in sensitivity of such global measures when attempting to understand the complex interrelationships of a dynamic psychosocial/physiologic process such as labor and birth.

The current study suggested that the pain experience of multiparas may be distinctly different than that of primiparas during labor. Prospective research is needed to explore the labor experience of multiparas and how it is affected by previous labor experience.

Although state anxiety is clearly related to increased pain during labor, these findings indicate that identifying the specific nature of the anxiety may assist in the development and validation of intervention strategies to lessen felt anxiety. Future research should examine labor related fears, how specific fears relate to state anxiety, and develop strategies to modify sources of anxiety during labor. Particularly, the feelings of confidence in ability to handle labor should be investigated in relationship to parity, prior experience with pain, childbirth preparation, and attitudes toward the birth experience.

The ability of the current data to account for only a small portion of the variance in transitional and especially second stage pain indicates the need for further investigation into the phenomena affecting pain perception during these labor phases. It can be reasoned that a future study should examine the impact of more physiological variables on pain experienced during transition and second stage, such as strength of uterine contractions, rate of fetal descent, and fetal position.

E. Implications for nursing practice

Although primarily a methodological investigation, a number of insights gained from the data are important to the nursing care of the parturient. Nurses must recognize the importance of a gravida's confidence in her ability to handle labor to her perception of pain, and actively utilize interventions designed to support and enhance confidence during labor. Assessment of the gravida's confidence and fear of pain during early labor should be used to develop an anticipatory plan of nursing care for the later phases of labor.

Nurses should also remember that the progression of pain for primigravidas and multigravidas may be very different. Multiparas will need additional support and reassurance to cope with pain that continues to intensify in the second stage of labor. Multiparas should be prepared for this probability and nurses must plan their care activities so that they are totally available to the parturient to assist her through this difficult period.

Finally, nurses must also be aware that in the middle/upper-middle class model of childbirth, feelings of control are closely related to expressions of satisfaction with the birth experience. Nursing care for this population must have as a primary objective the enhancement of each woman's sense of control during the labor and delivery process.

F. Conclusions

The major findings of this study were: 1) postpartum measurement of parturition pain on an ordinal scale of intensity was not a consistently reliable and valid reflection of pain intensity reported during labor; 2) postpartum measurement of parturition pain on the multidimensional PRI was statistically congruent with in-labor report, although devaluation of the pain of early labor and inflation of the pain of transitional labor tended to occur; 3) the convergent and discriminant validity of measures to assess features of the birth experience such as pain and anxiety require further investigation; 4) the progression of pain during labor may be different in nulliparous and multiparous women; 5) confidence in ability to handle labor and fear of pain had the most impact on pain reported during the first stage of

labor; 6) a strong relationship between postpartal feelings of control, pain, and enjoyment support a mastery model of childbirth.

This study further emphasized that a portion of the inconsistency of findings in childbirth research may be explained by measurement operations and timing. Although subjective report remains a valid operation of an internal phenomena such as pain, anxiety, or enjoyment, the conceptualization of the constructs in relation to their temporal sequence and the instrumentation of the constructs in relation to their theoretical definitions must be psychometrically tested and dictated by the research question to be answered by the data.

VI. APPENDICES

Appendix A

February 22, 1985

Dear Dr.

I am a Ph.D. candidate in the College of Nursing, University of Illinois at Chicago. For my doctoral research I am proposing to investigate the reliability of the self-report of labor pain. This study has been approved for scientific merit by a committee of five faculty at the University of Illinois Graduate College and has been reviewed for protection of human subjects by the Institutional Review Board at the University of Illinois.

I am seeking your approval to invite low risk parturients admitted to your service at _____ Hospital to participate in this research. Informed consent will be obtained and women will be free to withdraw from the study at any time. Enclosed is an abstract of the study design for your review. Data collection is planned for April, May and June, 1985. I will be present at the March 6, 1985, Ob-Gyne Medical Staff Meeting to answer any questions you may have regarding the study.

Please complete and return the enclosed reply card at your earliest convenience. Thank you for your assistance.

Sincerely,

Nancy K. Lowe, RN, MS

Appendix A (continued)

A Psychometric Analysis of the Self-report of Labor Pain

ABSTRACT

This non-experimental, field study is designed to investigate the reliability of the measurement of labor pain, and the relationships between pain measurement and a number of selected antecedent and labor related phenomena. The purposes of the study are:

1. To determine if postpartum recall of labor pain intensity and character accurately reflects pain intensity and character communicated during labor.

2. To determine the convergent and discriminate validity of instruments to measure labor pain, anxiety, fear of pain, feelings of control, and birth enjoyment/satisfaction.

3. To determine if postpartum recall of pain experienced during labor is affected by parity, childbirth preparation, support during labor, analgesia/anesthesia, anxiety, fear of pain, feelings of control, or birth enjoyment.

4. To identify the relationship between pain self-report obtained during labor and the physiologic variables of cervical dilatation, blood pressure, and heart rate.

Parturients will be invited to participated in the study by the investigator as they are admitted to the labor unit. Data collection will occur at three points during the first stage of labor (early, active, and transition), immediately after completion of the third stage, and during the postpartum hospitalization (24-72 hours). Measures to be obtained during labor include the McGill Pain Questionnaire (Melzack, 1981), the Self-Evaluation in Labor Questionnaire (Lederman, Ledermen & Kutzner, 1982), blood pressure, heart rate, and cervical dilatation. Postpartum data collection will include retrospective pain self-report on the McGill Pain Questionnaire; self-report of feelings of control during the birth experience by the Labor and Delivery Agency Scale (Humenich & Bugen, 1981); and measures of pain, anxiety, and enjoyment

Appendix A (continued)

from the Childbirth Experience Interview (Norr et al., 1977). Criteria for subject selection include spontaneous parturition in low risk, term, singleton pregnancy.

This study does not involve the use of any intrusive procedures which may impact on the health and/or safety of the mother or fetus. Informed consent will be obtained and all data will be kept in confidential subject files identified only by code numbers.

Appendix B

Consent Form

The main purpose of this study is to gain a better understanding of what a woman experiences during labor and delivery. I will talk with you a maximum of three times during your labor, once shortly after your delivery, and once during your postpartum hospital stay.

A portion of the postpartum interview will be tape recorded. All interviews will be kept strictly confidential.

There are no experimental procedures involved in this study and no risks to you or your child. Your care in labor will be the same as that of other patients admitted to the labor and delivery unit at _____ Hospital. Even though this study is of no direct confirmed benefit to you, I hope you will enjoy the opportunity to discuss your labor experience with me.

I shall be glad to answer any questions you may have. You are free to refuse to participate or to withdraw from participation in the study at any time.

_____

Volunteer's signature

_____

Date/time

_____

Principal Investigator's signature

Appendix C

ID#_____(1-3)

Obstetrical and Medical Record Information

1. Parity _____(4-7)

2. Age _____(8-9)

3. Marital status _____(10)
   1 - Single 2 - Married 3 - Divorced
   4 - Widowed 5 - Separated

4. Race _____(11)
   1 - Cauc 2 - Negro 3 - Oriental 4 - Other

5. Origin _____(12)
   1 - Angl. Sax. 2 - Amer. Ind 3 - Afro-Amer.
   4 - European 5 - African 6 - Asian
   7 - Mid. East. 8 - Lat. Amer. 9 - Other

6. Principal language _____(13)
   1 - English 2 - Spanish 3 - Slavic
   4 - Oriental 5 - Arabic 6 - Other

7. Time in hospital _____(14-15)
   Time of admission_____
   Date _____
   Time of delivery _____
   Date _____
   (Number of hours in hospital before delivery:
   If more than or equal to 1/2 hour, round up
   0 - delivered before admission or in E.R.
   1 - 1 hour or less.)

8. First stage (Hours/minutes) _____(16-19)

9. Second stage (Hours/minutes) _____(20-22)

10. Third stage(Hours/minutes) _____(23-25)

11. Total (Hours/minutes) _____(26-29)

12. Rupture of membranes _____(30)
    1 - SR 2 - AR

13. Time with ruptured membranes _____(31)
    1 - >5 hr. 2 - 5-12 hr.
    3 - 13-24 hr. 4 - > 24 hr.

Appendix C (continued)

14. Condition of fluid _____(32)
    1 - clear 2 - light mec.
    3 - thick mec. 4 - other

15. Pitocin _____(33)
    0 - none 1 - induction 2 - augmentation

16. Rationale _____(34)
    0 - not applicable 1 - elective 2 - PROM
    3 - postmaturity 4 - dysfunctional labor
    5 - other_____

17. Medication in labor _____(35)
    0 - none
    1 - analgesia only (demeral and/or morphine)
    2 - sedative only (visteral, phenergan, barbiturate)
    3 - analgesia and sedative
    4 - paracervical only
    5 - paracervical plus analgesia and/or sedative
    6 - Epidural
    7 - Epidural plus analgesia and/or sedative
    8 - Epidural plus paracervical (without analgesia or sedative)
    9 - any other combination or other anesthesia

18. Antibiotic in labor _____(36)
    0 - no 1 - yes

19. MgSO4 in labor 0 - no 1 - yes _____(37)

20. Demerol dosage _____(38)
    0 - none 1 - 25-50mg.
    2 - 75-100mg. 3 - over 100mg.

21. Method of delivery _____(39)
    1 - NSVD 2 - Low/outlet forceps
    3 - Mid forceps 4 - Spont. breech
    5 - Assisted Breech

22. Anesthesia _____(40)
    0 - none 4 - caudal
    1 - local 5 - penthrane
    2 - pudendal 6 - nitrous
    3 - epidural 7 - general
    8 - other

23. Episiotomy _____(41)
    0 - none 1 - yes

Appendix C (continued)

24. Laceration _____(42)
    0 - none 1 - yes, perineal
    2 - yes, cervical or cervical plus perineal

25. Baby sex _____(43)
    1 - female 2 - male 3 - twins

26. Baby weight(lbs.oz.) _____(44-47)

27. Apgar (1 min.) _____(48-49)

28. Apgar (5 min.) _____(50-51)

29. Feeding _____(52)
    0 - unknown 1 - breast 2 - bottle 3 - mixed

Complication of Labor and Delivery

30. Number of Complications of labor and delivery _____(53)
    0 - none 1 - one 2 - two or more

Specific Complications

31. Fetal labor complications _____(54)
    0 None
    1 Nuchal cord
    2 Fetal distress
    3 Persistent occiput posterior
    4 1 and 2
    5 1 and 3
    6 2 and 3
    7 all 3

32. Labor progress complications _____(55)
    0 None
    1 PROM (>12 hr)
    2 Prolonged latent phase
    3 Prolonged active phase
    4 Secondary arrest
    5 Prolonged second stage
    6 Precipitous labor (<3 hr.)
    7 1 plus any other
    8 Any combination of 2 through 5
    9 Any other combination

33. Blood pressure complications _____(56)
    0 None
    1 Preeclampsia
    2 Hypertension
    3 1 and 2

Appendix C (continued)

34. Febrile (>100) _____(57)
    0 - no 1 - yes

35. Third Stage Complications _____(58)
    0 none
    1 Postpartum hemorrhage
    2 Retained placenta
    3 1 and 2

Complications Baby

36. Number of complications _____(59)
    0 - none 1 - one 2 - two or more

Specific complications

37. Postmaturity _____(60)
    0 - no 1 - yes

38. Small for gestational age _____(61)
    0 - no 1 - yes

39. Respiratory distress _____(62)
    0 - no 1 - yes

40. Congenital anomaly _____(63)
    0 - no 1 - yes

Postpartum complications

41. Number of postpartum complications _____(64)
    0 - none 1 - one 2 - two or more

42. Specific postpartum complications _____(65)
    0 None
    1 Endometritis and/or subinvolution
    2 Breast engorgment
    3 Urinary tract infection
    4 Anemia
    5 Wound infection
    6 Any combination of above

43. Any other complication _____(66)
    (labor, delivery, baby, postpartum)
    0 - no 1 - yes

Appendix C (continued)

44. Maternal height _____(67/68)

45. Maternal weight prior to pregnancy _____(69-71)

46. Maternal weight at end of pregnancy _____(72-74)

Deck number _____(80)

Appendix D

ID#_____

Self-Evaluation in Labor Questionnaire

Directions: To each statement that I read to you, please indicate how you feel right now, that is, at this moment, by answering "very much so", "moderately so", "somewhat", or "not at all". Give the answer which seems to describe your present feelings best. (To examiner: Repeat responses at right after each statement is read until the patient can remember on her own.)

	Very much So	Moder-ately So	Some-what So	Not at all
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 afraid of the pain in labor	1	2	3	4
5. I feel at ease	1	2	3	4
6. I am relaxing between contractions	1	2	3	4
7. I am frightened of what is ahead of me	1	2	3	4
8. I feel strained	1	2	3	4
9. I feel anxious	1	2	3	4
10. I feel I am coping well with the contractions	1	2	3	4
11. I am worried about my progress	1	2	3	4
12. I feel nervous	1	2	3	4
13. I feel in control	1	2	3	4
14. I feel confident about handling labor	1	2	3	4
15. I am uncomfortable	1	2	3	4
16. I feel restless	1	2	3	4
17. I am upset about how I'm doing	1	2	3	4
18. I feel confident about the outcome of labor	1	2	3	4
19. I feel my baby and I are safe	1	2	3	4
20. I feel panicky	1	2	3	4
21. I can get comfortable between contractions	1	2	3	4

Appendix E

McGill Pain Questionnaire Instructions

Instructions to respondent: This is a questionnaire that allows us to get a measure of the amount of pain you are feeling during contractions. The questionnaire consists of 20 lists of words that describe feelings and sensations. I will read each list, or category, to you. If any of these words describe what you feel, please tell me and I will make a mark at the side of the appropriate word. Choose only one word in each category, the one that best expresses your feeling or sensation. If the words in any category do not describe what you feel, we will leave the category blank.

Appendix E (continued)

ID#_____

McGill Pain Questionnaire

	Early Labor (0-4)	Active Labor (4-8)	Transition Labor (8-10)	Second Stage
PRESENT PAIN INTENSITY (PPI)				
0 No pain				
1 Mild pain				
2 Discomforting				
3 Distressing				
4 Horrible				
5 Excruciating				
1. 1 Flickering				
2 Quivering				
3 Pulsing				
4 Throbbing				
5 Beating				
6 Pounding				
2. 1 Jumping				
2 Flashing				
3 Shooting				
3. 1 Pricking				
2 Boring				
3 Drilling				
4 Stabbing				
5 Lancinating				
4. 1 Sharp				
2 Cutting				
3 Lacerating				
5. 1 Pinching				
2 Pressing				
3 Gnawing				
4 Cramping				
5 Crushing				
6. 1 Tugging				
2 Pulling				
3 Wrenching				
7. 1 Hot				
2 Burning				
3 Scalding				
4 Searing				

Appendix E (continued)

	Early Labor (0-4)	Active Labor (4-8)	Transition Labor (8-10)	Second Stage
8. 1 Tingling				
2 Itchy				
3 Smarting				
4 Stinging				
9. 1 Dull				
2 Sore				
3 Hurting				
4 Aching				
5 Heavy				
10. 1 Tender				
2 Taut				
3 Rasping				
4 Splitting				
11. 1Tiring				
2 Exhausting				
12. 1 Sickening				
2 Suffocating				
13. 1 Fearful				
2 Frightful				
3 Terrifying				
14. 1 Punishing				
2 Gruelling				
3 Cruel				
4 Vicious				
5 Killing				
15. 1 Wretched				
2 Blinding				
16. 1 Annoying				
2 Troublesome				
3 Miserable				
4 Intense				
5 Unbearable				
17. 1 Spreading				
2 Radiating				
3 Penetrating				
4 Piercing				

Appendix E (continued)

	Early Labor (0-4)	Active Labor (4-8)	Transition Labor (8-10)	Second Stage
18. 1 Tight				
2 Numb				
3 Drawing				
4 Squeezing				
5 Tearing				
19. 1 Cool				
2 Cold				
3 Freezing				
20. 1 Nagging				
2 Nauseating				
3 Agonizing				
4 Dreadful				
5 Torturing				

PAIN RATING INDEX (PRI)

Sensory (1-10) _____

Affective (11-15) _____

Evaluative (16) _____

Miscellaneous (17-20) _____

Total (1-20) _____

Blood Pressure _____

Heart rate _____

Fetal heart rate _____

Cervical dilatation _____

Contraction freq. _____

Medications/Anesthesia _____

Date/Time _____

*Medication Code (since last MPQ)

0 None
1 Analgesia only (demerol, morphine, nisentil, etc.)
2 Sedative only (phenergan, vistaril)
3 Analgesia & sedative
4 Paracervical block
5 Paracervical plus analgesia &/or sedative
6 Epidural
7 Epidural plus analgesia and/or sedative

Appendix F

ID#_____(1-3)

Childbirth Experience Interview

Part I: LABOR AND DELIVERY

1. As you look back, what stands out most in your mind about your labor and delivery? (4)

_____

Strong positive:	Joy seeing baby delivered, beautiful experience 1
Mild positive:	Easier than expected, shorter, in control 2
Mixed:	Wonderful and painful. 3
Neutral:	Not clearly + or –, so far along when came, seemed unreal. 4
Mild Negative:	Periods when alone, nothing stands out, the enema, minor complaints. 5
Negative:	"the contractions", specific problems or periods of pain like transition. 6
Strong Negative:	"The pain" specified. 7
Other:	Not about labor, MD late, afraid not get to hospital , etc. 8

2. What did you like best about it? (5)

_____

Nothing	0
When it was over	1
Quick, easy, easier than expected	2
When saw baby was alright	3
The delivery, the birth, pushing, awake, seeing birth	4
Husband with me	5
Support of staff (doctors, nurse, midwife)	6
4 plus 5 or 6	7
Beautiful experience, the whole thing	8
Other (make card)	9

3. What did you like least? (6)

_____

Pain mentioned specifically	0
Contractions or general discomfort, not pain	1
Pain or contractions (discomfort, pressure, urge to push), but specifies for a limited time	2
Painful or uncomfortable condition not part of birth (Monitor, stirrups, enema, cold)	3
Anxiety, stress, worry, helplessness, waiting, overwhelmed, worried plus tired	4
Tired out, took a long time, hard work without mention of pain or anxiety	5
Annoyed with hospital or staff	6
Disappointed in self, own performance – lost control, couldn't push baby out	7
Nothing didn't like, easy time	8
Other (make card)	9

4. What time of day did your labor begin? _____

Appendix F (continued)

EARLY LABOR

5. Before you got to the hospital, what were your thoughts and feelings? (7)

Pain or discomfort, intense: wasn't thinking, was in pain; wished I could die;terrible....0
Milder or less continuous pain, discomfort; monitor, nausea, etc. 1
Emotional stress: overwhelmed, unprepared, angry, tired....2
Worried about condition of baby....3
Fatalistic waiting: this is it; no turning back; getting it over with; hoping it would be over....4
Coping with current happenings: getting to hospital, is it false labor, using breathing, etc....5
Mixed: positive plus pain or stress....6
Positive: relieved, excited, happy, be boy or girl, talking with husband, good so far along....7
Not in labor, not conscious, sleeping....8
Other, N.A. (make card)....9

6. How much pain or discomfort did you have before getting to the hospital, if any?

7. Would you categorize it as: (8)
None....1
A little....2
Some....3
Much....4
Very much....5

8. Did you feel any worry or concern before you got to the hospital? If yes, about what? (9)

Not worried....0
Worried about baby, baby's welfare....1
Worried about having a normal labor and/or delivery, is what's happening normal....2
Worried about getting through labor, enduring, how painful, how long, wanting to get it over....3
Worried, practical problems: getting to hospital, whether really in labor, getting hold of people....4
Worried, controlling contractions or own behavior or labor experience....5
Worry, staff competent....6
Worry, baby (1) plus 2 or 3....7
Other or other combinations (make card)....8
Not ascertained....9

9. Would you say you were worried: (10)
Not at all....1
A little....2
Some....3
Much....4
Very much....5

Appendix F (continued)

ACTIVE LABOR

10. Except for the time just before you went into the delivery room, what were you thinking and feeling most of the time you were in the labor room? (Probe for active labor) (11)

Intense pain or discomfort: terrible, wished I could die....0
Milder or less constant pain, discomfort....1
Emotional stress: overwhelmed, angry, tired....2
Worried about condition of baby....3
Fatalistic waiting, inevitability: getting it over with....4
Coping with current happenings:Using breathing, relaxing, dealing with contractions or urge to push.5
Mixed: positive plus pain or stress....6
Positive: relieved, excited, really having a baby, happy....7
Not conscious, not in labor, sleeping....8
Other, Not ascertained (make card)....9

11. Except for just before you went into the delivery room, how much pain or discomfort did you have most of the time?

---

12. Would you say you had: (12)
    None....1
    A little....2
    Some....3
    Much....4
    Very much....5

13. Did you feel any worry or concern most of the time you were in the labor room? If yes, about what? (13)

Not worried....0
Worried about baby, baby's welfare....1
Worried about having a normal labor and/or delivery, is what's happening normal....2
Worried about getting through labor, enduring, how painful, how long, wanting to get it over....3
Worried, practical problems: getting to hospital, whether really in labor, getting hold of people....4
Worried, controlling contractions or own behavior or labor experience....5
Worry, staff competent....6
Worry, baby (1) plus 2 or 3....7
Other or other combinations (make card)....8
Not ascertained....9

14. Would you say you were worried: (14)
    None....1
    A little....2
    Some....3
    Much....4
    Very much....5

Appendix F (continued)

TRANSITION

15. Where did you deliver, LDR or delivery room?_____
    When did you start pushing?_____

16. What were your thoughts and feelings during the half-hour or so before you were told to start pushing? (15)

_____

Intense pain, discomfort....0
Less intense or less constant pain, discomfort....1
Emotional stress: tired, overwhelmed, scared....2
Worried about condition of baby....3
Fatalistic waiting: well this is it, wanting to get it over....4
Coping with contractions, urge to push....5
Mixed: positive plus stress or pain....6
Positive: good to know so far along, excited....7
Sleeping....8
Other, N.A....9

17. How much pain or discomfort did you have just before you could start pushing?

_____

18. Would you say you had: (16)

None....1
A little....2
Some....3
Much....4
Very much....5

19. Did you feel any worry or concern just before you could start pushing? If yes, about what? (17)

_____

Not worried....0
Worried about baby, baby's welfare....1
Worried about having a normal labor and/or delivery, is what's happening normal....2
Worried about getting through labor, enduring, how painful, how long, wanting to get it over....3
Worried, practical problems: getting to hospital, whether really in labor, getting hold of people....4
Worried, controlling contractions or own behavior or labor experience....5
Worry, staff competent....6
Worry, baby (1) plus 2 or 3....7
Other or other combinations (make card)....8
Not ascertained....9

20. Would you say you were worried? (18)

None....1
A little....2
Some....3
Much....4
Very much....5

Appendix F (continued)

DELIVERY

21. In the delivery room before the baby was born, what were your thoughts and feelings? (19)

_____

_____

Intense pain, discomfort....0
Less intense or less constant pain, discomfort....1
Emotional stress: tired, overwhelmed, scared....2
Worried about condition of baby....3
Fatalistic waiting: well this is it, wanting to get it over....4
Coping with current happenings: pushing right, working....5
Mixed: positive and pain or stress....6
Positive: eager to see baby, excited, felt good to be pushing baby out....7
Not conscious, etc....8
Other, N.A....9

22. How much pain or discomfort did you have in the delivery room?

_____

23. Would you say you had: (20)
None....1
A little....2
Some....3
Much....4
Very much....5

24. How did it feel to push?

_____

Would you say it: (21)
Felt good, a relief, or was it....1
No pain, just hard work, or would you say you had....2
A little pain....3
Some pain....4
Much pain....5
Very much pain....6

Appendix F (continued)

25. Did you feel any worry or concern in the delivery room before the baby was born? If yes, about what? (22)

Not worried....0
Worried about baby, baby's welfare....1
Worried about having a normal labor and/or delivery, is what's happening normal....2
Worried about getting through labor, enduring, how painful, how long, wanting to get it over....3
Worried, practical problems: getting to hospital, whether really in labor, getting hold of people....4
Worried, controlling contractions or own behavior or labor experience....5
Worry, staff competent....6
Worry, baby (1) plus 2 or 3....7
Other or other combinations (make card)....8
Not ascertained....9

26. Would you say you were worried: (23)
None....1
A little....2
Some....3
Much....4
Very much....5

27. What stands out in your mind as the main feeling you had when the baby was born? (24)

Happy about baby....1
Concerned about baby's health, glad baby OK....2
Happy plus concerned about baby....3
Relieved labor over, mainly concerned with self....4
Relief and baby mentioned about equally....5
Happy about giving birth, having a baby....6
Other responses (make card)....7

28. After the baby was born, did you get to (25)
See and identify the baby....1
Hold the baby for 1 - 5 minutes....2
Hold the baby for 6 - 15 minutes....3
Hold the baby for 16 - 30 minutes....4
Breastfeed the baby....5

29. After the baby was born, did your significant other (husband) get to (26)
No significant other present for delivery....0
See and identify the baby....1
Hold the baby for 1 - 5 minutes....2
Hold the baby for 6 - 15 minutes....3
Hold the baby for 16 - 30 minutes....4

Appendix F (continued)

OVERALL LABOR AND DELIVERY

30. Now I'd like to ask you a few questions about your labor and delivery as a whole. Overall, how enjoyable or thrilling was this birth? (SHOW CARD) (27)

No pleasure at all.....1
2
3
4
5
6
Extremely enjoyable & thrilling.....7

31. Overall, how much pain or discomfort did you experience with this birth? (28)

No pain or discomfort.....1
2
3
4
5
6
Very much pain and discomfort.....7

32. Overall, how much worry or concern did you have with this birth? (29)

No worry or concern.....1
2
3
4
5
6
Very much worry and concern.....7

Part 2: SUPPORT DURING LABOR AND DELIVERY

33. Was there anything you did during labor to make yourself feel better? If yes, what? (30/31)

_____

_____

Nothing.....00
Lamaze-type breathing only.....01
Breathing plus something else.....02
Other pain-control technique: relaxation, concentration, back rub,change position (not breathing)..03
Walking, resting.....04
Distraction, thinking of something else.....05
Screeming, squeeze hand tightly, other increase of tension.....06
Call doctor or nurse.....07
Ask for pain medication.....08
Praying.....09
Other (make card).....10

Appendix F (continued)

34. How much did that help? (32)

None....1
A little....2
Some....3
Much....4
Very much....5

35. Who stayed with you for your labor and delivery? (33)

No one....0
Husband....1
Baby's father....2
Female relative....3
Male relative other than husband....4
Female friend....5
Male friend, not baby's father....6
Other (make card)....7

36. Did that person do anything to help you cope with your labor? If yes, what? (34)

No support, did nothing....0
Moral support, encouragement, or reassurance only, or unspecified help....1
Information about birth only: told me what was happening, it would soon be over....2
Practical help: told how to breathe, rubbed back, got me ice chips, etc....3
Moral support plus information....4
Moral support plus practical help....5
Information plus practical help....6
All three: Moral support, information, practical help....7

37. How much did that help? (35)

None....1
A little....2
Some....3
Much....4
Very much....5

38. While you were in labor did any of the staff (nurses or doctors) :

	YES	NO	
Encourage you or tell you everything would be OK	0	1	(36)
Talk about what was happening & explain what delivery would be like	0	1	(37)
Tell you how to breathe & relax to reduce pain	0	1	(38)
Rub your back, wipe your forehead, or other comfort measures	0	1	(39)
Talk with you to keep your mind occupied	0	1	(40)
Say anything that frightened or upset you(make card)	0	1	(41)
Do anything that annoyed or bothered you? (make card)	0	1	(42)

Appendix F (continued)

39. How did you feel about the encouragement and attention you got during labor and delivery? (43)

_____

_____

Positive or very positive: it was great, I feel good about it. It helped alot.....1
Mild positive: it was OK, feel pretty good about it, better than I expected, it helped some.....2
Neutral: I didn't think about it, other statements not clearly positive or negative.....3
Negative: dislikes what was done, the nurse annoyed me or didn't pay any attention to me.....4
Other (make card).....5

Part III: INFORMATION ABOUT BIRTH

40. Some women attend classes to prepare for birth. Did you attend any of these? If yes, what type?_____ (44)

No classes.....0
Lamaze only.....1
Hospital classes.....2
Both 1 & 2.....3
Health department....4
Both 2 & 4.....5
Other combinations...6
Other classes.....7

41. How many classes did you attend?_____ (45)

42. How much would you say you knew about having a baby before you gave birth? (46)

_____

Would you say you knew :
Nothing.....1
A little.....2
Some.....3
Much.....4
Very much.....5

43. Before you came to the hospital to have your baby, did you get any information about childbirth from:

	No	Yes	
Doctor in the office	0	1	(47)
Nurse in the office	0	1	(48)
Book on childbirth	0	1	(49)
Magazine or newspaper article	0	1	(50)
TV show or film showing a baby's birth	0	1	(51)
Friend	0	1	(52)
Mother	0	1	(53)
Sister	0	1	(54)

Total number of yes responses _____ (55)

Appendix F (continued)

44. What did you find to be the most useful source of information about childbirth? (56)

Nothing.....0
Classes.....1
Professional persons.....2
Literature or films.....3
Friends.....4
Relatives.....5
Previous childbirth experience.....6
Other.....7

Deck Number _____(80

Appendix G

ID#_____

Post-Partum Self-Evaluation in Labor Questionnaire

Directions: To each statement , please indicate your overall feelings during labor by answering "very much so", "moderately so", "somewhat", or "not at all". Give the answer which seems to best describe your overall feelings. Thank you.

	Very much So	Moder-ately So	Some-what So	Not at all
1. I felt calm.	1	2	3	4
2. I felt secure.	1	2	3	4
3. I was tense.	1	2	3	4
4. I was afraid of the pain in labor.	1	2	3	4
5. I felt at ease.	1	2	3	4
6. I was able to relax between contractions.	1	2	3	4
7. I was frightened of what was ahead of me.	1	2	3	4
8. I felt strained.	1	2	3	4
9. I felt anxious.	1	2	3	4
10. I felt I was coping well with the contractions.	1	2	3	4
11. I was worried about my progress.	1	2	3	4
12. I felt nervous.	1	2	3	4
13. I felt in control.	1	2	3	4
14. I felt confident about handling labor.	1	2	3	4
15. I was uncomfortable.	1	2	3	4
16. I felt restless.	1	2	3	4
17. I was upset about how I was doing.	1	2	3	4
18. I felt confident about the outcome of labor.	1	2	3	4
19. I felt my baby and I were safe.	1	2	3	4
20. I felt panicky.	1	2	3	4
21. I was able to get comfortable between contractions.	1	2	3	4

Appendix H

ID#_____

Self Perception of Instrumental Behavior in Childbirth

LABOR (First stage labor from 0 - 10 centimeters)
Please circle the number which shows the strength of your feelings during labor.

1. I was panicked.	1	2	3	4	5	6	7	I was in control.
2. I felt confident.	1	2	3	4	5	6	7	I felt helpless.
3. Everything seemed peaceful and calm.	1	2	3	4	5	6	7	Everything seemed chaotic and confused.
4. I felt competent.	1	2	3	4	5	6	7	I felt incompetent.
5. I was fearful.	1	2	3	4	5	6	7	I felt confident.
6. Everything seemed wrong.	1	2	3	4	5	6	7	Everything seemed right.
7. I had a sense of being in control.	1	2	3	4	5	6	7	I had a sense of not being in control.
8. I was not accepting of what was happening.	1	2	3	4	5	6	7	I was accepting of what was happening.
9. I felt good about the way I was behaving during labor.	1	2	3	4	5	6	7	I felt badly about the way I was behaving during labor.

Appendix H (continued)

BIRTH (Delivery/second stage labor)
Please circle the number which shows the strength of your feelings during birth.

10. I experienced a sense of strength.	1	2	3	4	5	6	7	I experienced a sense of weakness.
11. I was very active.	1	2	3	4	5	6	7	I was very passive.
12. I felt powerless.	1	2	3	4	5	6	7	I felt powerful.
13. I worked very hard.	1	2	3	4	5	6	7	Delivery required little effort on my part.
14. I was simply ending delivery.	1	2	3	4	5	6	7	I was dealing with delivery.
15. I trusted myself more than the doctors and nurses.	1	2	3	4	5	6	7	I trusted the doctors and nurses.
16. I felt very involved	1	2	3	4	5	6	7	I felt very detached.
17. I experienced a sense of passive suffering.	1	2	3	4	5	6	7	I experienced a sense of active striving.
18. I had a sense of not being in control.	1	2	3	4	5	6	7	I had a sense of being in control.
19. I was in charge of my delivery.	1	2	3	4	5	6	7	Someone or something else was in charge of my delivery.

Date/time_____

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Lowe, N.: Are Women's Health Issues Being Addressed in the Health Care System? Illinois Nurses Association, District Sixteen, June 6, 1983.

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