USE OF PRENATAL TESTING, EMOTIONAL ATTACHMENT TO THE FETUS AND FETAL HEALTH LOCUS OF CONTROL

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ABSTRACT

This study examines the relationship between maternal emotional attachment to the fetus, beliefs about fetal health locus of control, and use of prenatal testing (i.e., amniocentesis and maternal serum screening). To date, no research has directly addressed the link between these psychosocial variables and prenatal testing uptake. Ninety-one pregnant women at risk for fetal abnormalities (i.e., 35 years of age or older) participated in the study, of whom 35 had no testing, 27 had serum screening, and 29 had amniocentesis in their current pregnancy.

Results of a hierarchical multiple regression partially supported the hypothesis that internal and powerful others Fetal Health Locus of Control (Labs & Wurtele, 1986) and prenatal testing status would be predictive of attachment (Prenatal Attachment Inventory; Muller, 1993) over and above the effects of gestational age, maternal age and attitude toward abortion. Fetal Health Locus of Control beliefs regarding one's own role (FHLC-I) in determining the health of one's fetus were found to be predictive of prenatal attachment. Results failed to support the hypothesis that the role of health professionals (FHLC-P) would be predictive of prenatal attachment. As predicted, women who had not used prenatal testing or who underwent amniocentesis tended to have stronger prenatal attachment than those who underwent serum screening only.

Results supported the hypotheses that stronger attachment to the fetus would be positively correlated with both FHLC-I and FHLC-P scores. Women who had no testing were found to hold less favourable attitudes toward abortion and rate their religious as stronger than those who had amniocentesis. Emotional attachment to the fetus was stronger among women who had previous miscarriages than those who had not, but did not differ between women who had a previous abortion and those who had not.

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1. INTRODUCTION AND OBJECTIVES

The development of a wide array of reproductive technologies has rendered procreative decision-making more complicated today than in any preceding era. These medical advancements have bestowed upon women more reproductive choice and control. Prenatal diagnostic screening (e.g., Maternal Serum Triple Marker Screening) and prenatal diagnostic testing (PDT; including amniocentesis and chorionic villus sampling) are advancements that are having a substantial impact on the experience of pregnancy for many women. PDT offers the potential for more control over the birth of a child with a disability by providing information about the genetic and health status of the fetus during pregnancy. However, because there are no therapeutic interventions available for the majority of conditions that testing detects, the options open to women following a positive diagnosis consist of preparing for a life with a child with a disability or terminating the pregnancy (Schwartz-Cowan, 1994). The decision to continue or terminate the pregnancy is made all the more difficult as definitive PDT results are not available until the 17th to 20th weeks of pregnancy (Canadian College of Medical Geneticists [CCMG] & Society of Obstetricians & Gynaecologists of Canada [SOGC], 2001a).

Research has shown that the process of maternal-fetal bonding, or prenatal emotional attachment, begins as early as ten weeks gestation (Caccia, Johnson, Robinson, & Barna, 1991) and increases rapidly beginning at approximately 16 weeks gestation (Grace, 1989). Therefore, when PDT is utilized the period of uncertainty regarding the future of one's pregnancy overlaps with the period during which maternal-fetal bonding typically takes place. Several studies have shown that the use of prenatal

testing delays the process of prenatal bonding (Heidrich & Cranley, 1989; Moyer et al., 1999; Rapp, 1999; Silvestre & Fresco, 1980). Katz-Rothman (1993) states, "there are months where women wait in this limbo of 'tentative pregnancy,' unsure whether they are 'mothers' or 'carriers of a defective fetus'" (p. 7). The attachment a woman feels toward her fetus has implications not only for the later maternal-child relationship (Leifer, 1977; Muller, 1996), but also for compliance with various pregnancy-related health practices (Condon, 1988; Lindgren, 2001).

Another key variable that may relate to both maternal-fetal bonding and prenatal testing uptake is Fetal Health Locus of Control (FHLC; Labs & Wurtele, 1986). Past research has found a relationship between compliance with prenatal health care practices and perceived locus of control regarding the health of the fetus. Specifically, women who feel that they (internal FHLC; FHLC-I) or their physician (powerful others FHLC; FHLC-P) control the health of their fetus tend to engage in more positive health practices than those who score lower on these dimensions (Haslam, Lawrence, & Haefeli, 2003; Labs & Wurtele, 1986; Stewart & Streiner, 1994, 1995). Chance FHLC has been associated with engaging in negative health practices (Stewart & Streiner, 1994, 1995). Use of prenatal testing may also be viewed by women as a positive health practice, and thus be associated with FHLC, but such an assumption has not yet been investigated. As well, the literature has not addressed the potential relationship between FHLC and prenatal testing.

1.1 Objectives

The purpose of this study was twofold. While much research attention has been directed toward the medical aspects of prenatal testing, very few studies have examined the psychosocial implications of prenatal testing for women. Especially lacking is

detailed information regarding the consequences of testing on women's experience of pregnancy. The following study addresses this gap in the literature by examining how certain psychosocial factors are related to prenatal testing status. Specifically, participants were categorized as having undergone no testing, serum screening, or amniocentesis. These three groups were compared in terms of maternal emotional attachment to the fetus and fetal health locus of control. As well, several demographic and attitudinal variables were examined, such as gestational age, number of previous miscarriages and abortions, number of children, abortion attitudes, and strength of religious beliefs. In the present study, the term "miscarriage" is used to refer to spontaneous abortions, whereas the term "abortion" is used to refer to therapeutic abortions.

The second purpose of this study was to examine the predictors of prenatal attachment, and specifically, to investigate the ability of prenatal screening and diagnostic testing (henceforth referred to as "prenatal testing") and fetal health locus of control to predict maternal bonding with the fetus. Of particular interest was whether prenatal testing status would be predictive of prenatal emotional attachment when the effects of maternal age, gestational age, abortion attitudes, and the FHLC-I and FHLC -P subscales are controlled. Although both prenatal emotional attachment and FHLC have been found to relate to health behaviours, to date no research has examined the link between FHLC and prenatal emotional attachment. Therefore, the following study examines whether one's perceptions of having internal and/or external control over the health of one's fetus, and one's usage of prenatal testing have implications for the maternal-fetal bond.

This study will focus exclusively on the experience of pregnancy for women. The experience of fathers is beyond the scope of the present research. The FHLC measure has not been adapted for use with fathers. Several studies have investigated paternal-fetal attachment; interested readers may refer to Condon (1985); Condon and Dunn (1988); Condon and Esuvaranathan (1990); Mercer, Ferketich, May, DeJoseph, and Sollid (1988); and Weaver and Cranley (1983).

This paper will first review methods of prenatal testing, followed by discussions of prenatal emotional attachment and the possible impact of prenatal testing on attachment. Health locus of control will be discussed in general terms, followed by a review of fetal health locus of control. Each locus of control will be discussed in terms of its possible relationship with prenatal testing uptake. The possible relationship between attitudinal/demographic variables and prenatal testing uptake will be briefly examined. Finally, the objectives and benefits of the study will be considered.

1.2 Prenatal Testing Methods

1.2.1 Amniocentesis. Amniocentesis is usually performed between 15 and 17 weeks gestation (CCMG & SOGC, 2001a), though a newer technique referred to as early amniocentesis may be performed between 11 and 14 weeks gestation (Delisle & Wilson, 1999). According to Health Canada (2002), amniocentesis is most commonly performed between 15 and 16 weeks gestation. The University of Manitoba Department of Biochemistry and Medical Genetics (2001b) reports that in Manitoba, amniocentesis results are usually available within two to three weeks after testing. Canadian clinical practice guidelines state that results are generally available before the 20th week of pregnancy (CCMG & SOGC, 2001a). Amniocentesis is performed through the analysis of a sample of amniotic fluid from the amniotic sac. The technician performing the

procedure uses ultrasound sonography to locate the fetus, then inserts a needle into the amniotic sac (Anderson, 1995; Gosden, Nicolaides, & Whitting, 1994). The fetal cells within the fluid are analysed for various disorders, including chromosomal abnormalities (e.g., Down syndrome and Trisomy 18), and neural tube defects such as anencephaly, encephalocele, spina bifida, and multiple vertebrae defects (Anderson, 1995; CCMG & SOGC, 2001b). Amniocentesis is most often offered to women due to advanced maternal age (i.e., 35 years of age and over), but may also be offered to younger women with a personal or family history of genetic conditions or a serum screen result (see 1.2.2) that indicates increased risk (Heyman & Henriksen, 2001).

A study of women at low risk for having a child with Down syndrome who received amniocentesis found that 0.17% of fetuses were diagnosed with Down syndrome; there were no false positives or false negatives (Tabor et al., 1986, as cited in Dick, 1996). Dick (1996) reports that other, non-randomized studies have reported similar accuracy rates for amniocentesis. Heckerling, Verp, and Hadro (1994) report a 0.07% false-positive rate and a 0.4% false-negative rate for amniocentesis.

Risks to the fetus from amniocentesis include hyaline membrane diseases, miscarriage, and needle piercing of the fetus itself, the umbilical cord, or the placenta (Anderson, 1995). The risk of miscarriage from the procedure has been estimated at between 0.5% and 1% (CCMG & SOGC, 2001a; Delisle & Wilson, 1999; Jones, 2000; University of Manitoba Department of Biochemistry and Medical Genetics, 2001b). Risks to the pregnant woman from amniocentesis include haemorrhage, perforation of the abdominal wall, infection, and vaginal leakage of amniotic fluid and/or minor bleeding (Anderson, 1995). Early amniocentesis has an increased risk of fetal loss, newborn clubfoot, post-procedural amniotic fluid leakage, and cytogenetic culture

failures (thus requiring additional invasive testing), and as such is not recommended for routine prenatal diagnosis (CCMG & SOGC, 2001a).

Early amniocentesis is not currently offered in the Provinces of Saskatchewan or Manitoba. Traditional amniocentesis is the most common form of prenatal diagnostic testing in Canada (Royal Commission on New Reproductive Technologies, 1993). Uptake rates of amniocentesis are quite low, most likely due to the risks and invasive nature of the test (Heyman & Henriksen, 2001). Heyman and Henriksen (2001) report that, overall, 28% of women who are initially offered amniocentesis choose to make use of it. Of those offered amniocentesis and maternal serum screening (to be discussed later), 18% of pregnant women chose to undergo amniocentesis without maternal serum screening, and 37% of those offered only amniocentesis chose to undergo the procedure (Heyman & Henriksen, 2001). Women over the age of 35 are significantly more likely to accept amniocentesis than younger women (Heyman & Henriksen, 2001). Within the present study, use of prenatal testing (i.e., maternal serum screening and amniocentesis) will be analyzed in relation to various psychosocial and demographic variables in order to determine relevant consequences of use.

1.2.2 Maternal serum screening. Maternal serum screening involves the analysis of maternal serum collected through a simple blood test. The test is usually performed between 15 and 18 weeks gestation, but may be performed as late as 22 weeks gestation (University of Manitoba Department of Biochemistry and Medical Genetics, 2001a). The Regina-Qu'Appelle Health Region recommends that serum screening be performed just after 15 weeks gestation so that results are received by 16 weeks gestation, which allow amniocentesis to be performed and the results to be made available at 19 weeks gestation (Carson, 2003). Most frequently, screening for alpha-fetoprotein (AFP) is

performed in conjunction with human chorionic gonadotropin (hCG) and uE3 (unconjugated estriol) screening, which is referred to as Maternal Serum Triple Marker Screening (TMS; Bassett, 2000; Suthers & Haan, 1995). TMS is used most frequently, as no single marker has been found to adequately predict the occurrence of Down syndrome (Suthers & Haan, 1995). TMS may be used to screen for abnormally high or low levels of alpha-fetoprotein (AFP), abnormally high levels of human chorionic gonadotropin (hCG), and abnormally low levels of unconjugated estriol (uE3) within the mother's blood (Bassett, 2000). Low levels of AFP, and high levels of hCG and uE3 may indicate Down syndrome (Bassett, 2000; Gosden et al., 1994). Elevated levels of AFP may be indicative of neural tube disorders (Bassett, 2000). Concurrent low levels of AFP, hCG, and uE3 may indicate the presence of Trisomy 18 (Bassett, 2000). The risks of specific abnormalities are calculated through complex formulae that compare a woman's serum protein level against the median for the population, and take maternal age, gestational age, diabetic status, race, and maternal weight into account (Bassett, 2000).

Results of a pilot project in British Columbia indicate that 8% women who receive TMS screen positive for abnormalities, with approximately 6% screening positive for Down syndrome, and 1-2% screening positive for neural tube disorders (Bassett, 2000). Generally, 3% to 4% of women screened using AFP will receive abnormal results regarding the health of their fetus (Suthers & Haan, 1995; University of Manitoba Department of Biochemistry and Medical Genetics, 2001a). In a review of previous studies, Wald et al. (1998, as cited in Bassett, 2000) found that overall 7.5% of women received abnormal initial results from TMS, but that after adjustment for incorrect gestational age using ultrasound, only 5.7% of women received abnormal

results. They also found that 81% of women proceed to have amniocentesis following an abnormal TMS result. Health Canada (2002) reports that 5% to 10% of women receive an 'increased risk result' from TMS, but that of these women, only 1% to 2% of these women are actually carrying a fetus affected by a genetic anomaly. According to Canadian clinical practice guidelines, TMS has a 4% false positive rate for fetal Down syndrome (CCMG & SOGC, 2001b). Due to this margin of inaccuracy, no definitive decisions are made regarding the pregnancy based on the results of TMS. Rather, those identified as at risk for abnormalities are referred for further testing such as ultrasound and amniocentesis (Royal Commission on New Reproductive Technologies, 1993; Suthers & Haan, 1995).

Of the fetuses that screen positive for abnormalities, approximately 75% of the test results will be indicative of Down syndrome (Bassett, 2000). In a meta-analysis, Conde-Agudelo and Kafury-Goeta (1998) found that that the median for false positive results for Down syndrome from TMS ranged from 4 to 8%, and that the sensitivity of the test (true positives) ranged from 67 to 73%. The detection rates for Down syndrome vary according to maternal age; Wald et al. (1992, as cited in Bassett, 2000) report that TMS detects the condition 39% of the time in women under 37 years of age, and 71% of the time in women over 37 years of age. Cheng et al. (1993, as cited in Bassett, 2000) found that TMS detects 67% of Down syndrome cases in women under 30, and 100% of cases in women between 30 and 39 years of age. Overall, TMS detects between 60% and 70% of fetuses with Down syndrome (Bassett, 2000; Cuckle, 1996, as cited in Heyman & Henriksen, 2001; University of Manitoba Department of Biochemistry and Medical Genetics, 2001c).

TMS can detect between 40% and 60% of fetuses affected by Trisomy 18 (Bassett, 2000; University of Manitoba Department of Biochemistry and Medical Genetics, 2001c). The false positive rate for Trisomy 18 is approximately 0.2% (University of Manitoba Department of Biochemistry and Medical Genetics, 2001c). Closed neural tube defects (i.e., those covered by skin) cannot be detected by TMS (Bassett, 2000). Approximately 12% to 25% of positive screens for abnormalities will indicate a heightened risk for open neural tube defects (e.g., ancephaly and spina bifida). Reported detection rates for open neural tube defects using TMS vary from 70% to 80% (Bassett, 2000; Suthers & Haan, 1995). Approximately 100% of women who are identified through TMS as having fetuses at risk for neural tube defects choose to have ultrasound to confirm the diagnosis (Suthers & Haan, 1995).

Maternal serum screening has only recently begun in Saskatchewan, and it is anticipated that it will be offered to all pregnant women, not only those at risk for abnormalities, though it is not currently a routine, standard component of prenatal care. In Manitoba, serum screening is offered to every pregnant woman, but the test is voluntary and women are to be given the opportunity to decline the test (University of Manitoba, 2001c). Although the uptake rate of this procedure is higher than that of amniocentesis (approximately 73%, Bassett, 2000; 72% Heyman & Henriksen, 2001; approximately 60%, Manitoba Maternal Serum Screening Programme, personal communication, January 16, 2004), there is variability in its usage. Within the present study, participants who underwent prenatal testing will therefore be grouped into either "amniocentesis" or "serum screening," and the relationship between these forms of testing and psychosocial and demographic variables will be analyzed. Serum screening

has been included as a distinct grouping from amniocentesis given the lack of definitive results provided via this technique.

1.2.3 Chorionic villus sampling. Chorionic villus sampling (CVS) is usually performed at 10 to 12 weeks gestation (Anderson, 1995; Gosden et al., 1994; Smith, 1995). It is used to detect chromosomal abnormalities (e.g., Down syndrome and Trisomy 18) and may be used for DNA testing (e.g., to test for Huntington disease or cystic fibrosis), but cannot detect neural tube defects (Anderson, 1995). CVS involves passing a catheter through the cervix (transcervical CVS) or a needle through the abdomen (transabdominal CVS) in order to obtain a sample of the chorionic villi (Anderson, 1995). The chorionic villi are "finger-like projections which surround the embryonic sac in early pregnancy and will later form the placenta" (Smith, 1995, p. 91).

Overall, Dick (1996) reports that CVS accurately diagnoses 99% of fetuses carried by women at high risk for Down syndrome. The false-positive rate for CVS is approximately 0.1%, and the false-negative rate is approximately 0.4% (Heckerling et al., 1994).

The risks associated with CVS are largely dependent upon the level of experience of the person performing the procedure (Jenkins & Wapner, 1999). Generally, the risk of miscarriage for CVS is estimated at approximately 1 - 2% (CCMG & SOGC, 2001). CVS is considered to be safer than early amniocentesis in terms of pregnancy loss and postnatal postural deformity rates (Jenkins & Wapner, 1999). It has been suggested that CVS carries a heightened risk of limb reduction of the fetus. However, Anderson (1995) reports that most studies have not found the rate of limb reduction to be significantly different from the normal rate of such birth defects. Through investigations of an international registry and various collaborative studies, the

World Health Organization (1999, as cited in Jenkins & Wapner, 1999) has concluded that limb reduction is not associated with CVS, provided it is performed after eight weeks gestation. Potential risks to pregnant women receiving CVS include post-procedural bleeding, hematoma, temporary elevations in maternal AFP (which may be associated with miscarriage), infection, and rupture of the chorion membranes, though these risks are thought to be infrequent to rare (Jenkins & Wapner, 1999).

CVS is not currently offered in the Provinces of Saskatchewan or Manitoba. Therefore, use of CVS will not be included as a category in this study.

1.2.4 Ultrasonography. Ultrasound is a routine part of prenatal care in Canada (Royal Commission on New Reproductive Technologies, 1993). Ultrasound involves passing an ultrasound transducer that produces high-frequency sound waves over the pregnant woman's abdomen (Gosden et al., 1994). The waves pass through tissue, and the echoes of these waves are reproduced visually on a screen (Royal Commission on New Reproductive Technologies, 1993).

Ultrasound is generally considered a screening test, as women found to be carrying fetuses that appear to have abnormalities are referred for further testing, such as additional ultrasound screening or PDT (Royal Commission on New Reproductive Technologies, 1993). Ultrasound may also be used to provide a decisive diagnosis of fetal abnormalities. In this case, a detailed examination of the fetus is performed which may last as long as one hour (Royal Commission on New Reproductive Technologies, 1993). Scans are typically offered at 12 and 20 weeks gestation (Gosden et al., 1994).

As ultrasonography is a standard part of prenatal care, and therefore is widely utilized, it will not be included as a variable within this study. It is unlikely that

sufficient variation in usage among the sample would exist to allow for meaningful statistical analysis.

Prenatal testing has had an indelible effect on the experience of pregnancy for women. However, little research has examined the psychosocial implications of testing. A review of the concept of maternal-fetal emotional attachment ensues, followed by a discussion of the possible implications of prenatal testing on prenatal attachment.

1.3 Emotional Attachment to the Fetus

Bowlby (1988) regards the predisposition to form intimate bonds with other individuals as "a basic component of human nature" (p. 120-121). Bowlby (1969) proposed attachment theory in order to account for the affectionate bond that develops between children and their parents, especially their mothers. He states that the goal of the attachment behaviours of infants and young children is to ensure that an adult is in close proximity or is accessible so that protection, comfort, and assistance may be provided as needed (1988). As the child develops, internal representational models are formed of the self, of others, and of the patterns of interaction between them. These attachment experiences of the young child have a profound influence on personality development and on later attachment relationships.

Approximately 90 per cent of attachment research has focused on the attachment of infant to parent, with parent to infant attachment having received much less attention (Condon, 1993). Having received an even smaller amount of attention is the formation of attachment relationships prior to birth. However, the idea of attachment relationships between a woman and her fetus is not a recent development within the psychology of pregnancy. Deutsch (1945, as cited in Condon, 1993) was the first to suggest that attachment may begin during pregnancy. Rubin (1975) proposed four tasks of

pregnancy, which include (1) seeking safe passage for herself and the child, (2) ensuring that the child is accepted by significant others in her family, (3) binding-in to her unknown child, and (4) learning to give of herself. Rubin's conceptualization of "binding in" is quite similar to "bonding," and has evolved into the construct of "prenatal attachment." Within nursing literature, 'prenatal attachment' has been defined as "the unique, affectionate relationship that develops between a woman and her fetus" (Muller, 1993, p. 201).

Katz-Rothman (1993) states that the view of birth, the moment of initial separation, as the point of attachment is the result of a male-dominated worldview; rather, she states that this moment "might be better seen as . . . mother and baby . . . *continuing* and not *establishing* their relationship" (p.115). Cranley (1981) states that "there is a qualitative change in the mother's relationship with her infant at the time of birth, but by no means is it the beginning of their relationship" (p. 281). Despite this view of attachment as a continuous process that begins prior to birth, and although the concept of prenatal attachment originated from attachment theory, it is necessary "to clarify that pre- and post-birth attachments may require slightly different conceptual frameworks" (Laxton-Kane & Slade, 2002, p. 254). Condon (1993), a psychiatrist, has proposed a model of adult attachment and has applied it to maternal prenatal attachment. Condon states that his conceptualization of attachment follows the work of Bretherton (1985), who broadly defines 'attachment' as an emotional tie or psychological bond. Condon's model recognizes five dispositions: to know, to be with and interact with, to avoid separation or loss, to protect, and to gratify needs.

Bowlby (1988) conceptualized attachment as a bi-directional process between child and caregiver. This too requires adjustment for the purpose of examining prenatal

emotional attachment. Laxton-Kane and Slade (2002) state that in the context of pregnancy, there are no opportunities for reciprocal interactions. Therefore, categories of maternal postnatal internal representations that relate to the categories of the child's reunion behaviour have not been used within prenatal attachment research, due to the lack of ability to observe the "other" (i.e., the fetus). The authors state that alternatively, prenatal attachment has focused on examining the intensity and quality of the maternal-fetal bond. The Prenatal Attachment Inventory (PAI; Muller, 1993; Appendix A) and Maternal-Fetal Attachment Scale (MFAS; Cranley, 1981) both examine prenatal attachment on a unidimensional continuum of more versus less attachment. Laxton-Kane and Slade further state that the mother's own attachment experiences, the impact of other roles and responsibilities which compete with that of 'caregiver,' and the support available during the pregnancy are more influential in determining prenatal attachment due to the lack of reciprocal interactions. Findings from a study by Siddiqui, Hagglof, and Eisemann (2000) support the contention that a woman's perceived attachment experiences from her own childhood impact on her future prenatal attachment. Stronger prenatal emotional attachments were formed among those who experienced emotional warmth from their mothers and rejection from their fathers. A study by Mikulincer and Florian (1999) provides additional support for the contention that women's own attachment experiences impact their prenatal attachment. Using the Adult Attachment Interview (Main, Kaplan, & Cassidy, 1985, as cited in Mikulincer & Florian, 1999) and MFAS (Cranley, 1981), the study found that securely attached women were strongly attached to their fetus from early in the pregnancy. Further, they found that women with an avoidant attachment style showed weak attachment to the fetus in the first and last trimester and stronger prenatal attachment in the second trimester, and that women with

an anxious-ambivalent attachment style showed a gradual increase in attachment throughout the pregnancy.

Thus, although the emotional tie that women experience with their fetus might not be considered "attachment" in the traditional sense of the term within the field of psychology (i.e., following in the tradition of Bowlby), it is the term that has been used by those who have operationalized the construct, and has been given credence through the development of theoretical underpinnings and a nomothetic network; therefore the term "attachment" will be used synonymously with "bonding" within this study.

Speckhard (1997) suggests that attachment begins long before birth, that it starts when women begin to form a mental image of their baby and feel the desire to nurture and protect it. Attachment to the fetus begins as early as 10 weeks gestation (Caccia et al., 1991), and increases rapidly beginning at approximately 16 weeks gestation (Grace, 1989). It is well established that maternal-fetal attachment increases significantly through pregnancy (Armstrong, 2002; Caccia et al., 1991; Condon, 1985; Damato, 2000; Grace, 1989; Lindgren, 2001), and with quickening (Bloom, 1995; Damato, 2000; Heidrich & Cranley, 1989). Additionally, Reading, Cox, Sledmere, and Campbell (1984) found that positive feelings toward the fetus are significantly related to fetal movement and gestational age. Rubin (1975) argues that quickening and hormonal changes early in the second trimester result in both the most rapid increase in attachment during pregnancy and in the highest overall level of attachment during pregnancy.

Rubin (1975) outlines the stages of binding in or prenatal emotional attachment; during the first trimester, there is little attachment toward the fetus, rather, the woman is becoming accustomed to and accepting of the state of pregnancy. In the second trimester, quickening and hormonal changes act to make the woman more comfortable

with the pregnancy state and focused on providing a good home for the fetus while in utero. During this time, the bond between mother and fetus grows rapidly. In the final trimester, the bond between the mother and fetus persists, but the woman grows tired of the state of pregnancy. The developmental process proposed by Rubin has been supported by research (Condon, 1985; Leifer, 1977). Rubin's assertion that binding in is related to the desire to provide a good home for the fetus is supported by Lindgren's (2001) findings that maternal prenatal attachment was positively correlated to pregnancy-related health practices (e.g., getting adequate sleep, not using illegal drugs or alcohol, receiving prenatal care, eating healthy foods, etc.). As well, Condon (1988) found that among women who acknowledged they had consumed alcohol prior to pregnancy, reduction in alcohol consumption during pregnancy was positively correlated with maternal-fetal attachment. Condon (1986) suggests that women who feel less emotional attachment to their fetus may have more difficulty subjugating their own needs to those of their fetus.

Stainton (1994) argues that the process of becoming acquainted with one's fetus (i.e., getting to know the fetus as a separate and distinct person) via characteristics that may be known during pregnancy contributes to the attachment process. Rubin (1975) states that at birth, mothers have a sense that they already know the child that is only limited by the inability to perceive the child visually or auditorily during pregnancy. As visualization of the fetus in the form of imagining its characteristics is considered to be an integral component of prenatal attachment (e.g., there are questions on both the PAI [Muller, 1993] and the MFAS [Cranley, 1981] that refer to imagining how the baby looks), one may easily speculate that the ability to actually see the fetus during ultrasound may increase attachment. However, research has consistently failed to find a

relationship between ultrasound usage and prenatal attachment (Heidrich & Cranley, 1989; Kemp & Page, 1987; Reading et al., 1984). This supports the view discussed earlier that within the context of the present study, it is doubtful that analysis of ultrasound use would provide meaningful results.

Health professionals can both assess and encourage women's affective relationship with their fetus (Fuller, 1990). It is this encouragement that demonstrates to women that attachment behaviours are both accepted and valued (Fuller, 1990). Rubin (1977) states that "the bonds created by involvement, identification and commitment formed during pregnancy secure the fabric of the [mother-child] relationship [postnatally]" (p. 69). Failure to interact with the fetus, or denials of an awareness of its movements may be indicative of problems with maternal-fetal attachment, which may lead to problems with maternal-infant attachment postnatally (Fuller, 1990; Leifer, 1977).

A preliminary study found that women who were given 'attachment intervention' designed to promote prenatal attachment exhibited significantly more postnatal attachment behaviours than a control group who only received standard prenatal care (Carter-Jessop, 1981). Mikhail et al. (1991) found that women who were randomly selected to count fetal movements exhibited significantly higher attachment than controls who did not count these movements. However, Davis and Akridge (1987) found no significant differences in pre- or post-natal attachment between women receiving three attachment intervention sessions during pregnancy and a control group.

Leifer (1977) found that women with greater emotional attachment to their fetus were more likely than those who were less attached to perceive the baby as "real" and to make preparations prior to its birth. She also found that this emotional attachment was

predictive of early maternal behaviour and attitudes. Women who developed strong feelings of attachment early in the pregnancy also felt intensely close to their babies postpartum, were responsive to their infants' needs, and enjoyed caring for their infants. Those who developed only minimal attachment to their fetus were more likely to feel detachment and conflicted feelings toward their infant postpartum, and were less likely to breastfeed. However, there are many methodological shortcomings with this study; the lack of statistical analysis and a small sample size makes her conclusions questionable. Muller (1996) found a modest correlation between prenatal attachment scores and postnatal attachment scores as measured by the Maternal Attachment Inventory (Muller, 1994), which Muller designed as a complementary questionnaire to the PAI (Muller, 1993). Muller (1996) also found a significant correlation between PAI scores and postnatal maternal separation anxiety. Muller (1993) found that prenatal attachment correlates with adaptation to pregnancy and with positive attitudes toward the pregnancy and the baby. Bloom (1995) found a modest correlation between prenatal attachment (as measured by the MFAS) and maternal-infant attachment (as measured by Avant's Maternal Attachment Assessment Strategy (Avant, 1982, as cited in Bloom, 1995). Siddiqui and Haeggloef (2000) compared prenatal attachment during the third trimester to behavioural observations of mother-infant interactions approximately 12 weeks after birth that were coded as per Lewis and Lee-Painter's mother-infant dyad coding scheme (1974, as cited in Siddiqui & Haeggloef, 2000). The study found that prenatal attachment positively correlated with involvement during postnatal interaction, mother-to-infant stimulation (generally), mother-to-infant proximal stimulation (e.g., touching, kissing), and mother-to-infant distal stimulation (i.e., vocalization and smiling). Prenatal attachment was also negatively correlated with maternal non-

involvement behaviours (i.e., looking away and passive attention). Only maternal stimulation executed in response to infant behaviour was not correlated with prenatal attachment.

1.4 Prenatal Testing and Prenatal Emotional Attachment

A review of previous studies (Wald et al., 1998, as cited in Bassett, 2000) found that 91% of pregnancies in which a fetal defect was detected via amniocentesis were aborted. As amniocentesis is not available until the 15 to 17th week of pregnancy, this willingness to abort extends well into the critical gestational time period for maternal-fetal attachment. Katz-Rothman (1993) states that a problem with the use of prenatal testing is that it creates contradictory demands:

> It asks women to accept their pregnancies and their babies, to take care of the babies within them, and yet be willing to abort them. We ask them to think about the needs of the coming baby, to fantasize about the baby, to begin to become the mother of the baby, and yet be willing to abort the genetically damaged fetus. At the same time. (p. 6)

The statements that Katz-Rothman (1993) uses to explicate how women are encouraged to "accept their pregnancies" (p. 6) are quite similar to those used within the PAI (Muller, 1993) to measure attachment to one's fetus. Therefore, one may suggest that the use of prenatal testing and selective abortion is placing women into a situation in which incongruous demands are being placed upon them – both to develop an affective bond with their fetus and to be willing to abort it if the fetus is unacceptable. As Katz-Rothman (1993) states, "a woman's commitment to her pregnancy under the conditions

imposed by amniocentesis can only be tentative. She cannot ignore it, but neither can she wholeheartedly embrace it" (p. 101).

The 'tentative pregnancy' is a difficult and stressful time for pregnant women. Women who have utilized amniocentesis often report that waiting for the results is the most difficult aspect of the experience (Dixson et al., 1981). Katz-Rothman (1993) states that, "most women manage to keep the anxiety under control, but there is a cost to that. Distance must be maintained" (p. 102). When interviewed, pregnant women often indicate that using prenatal testing prevented them from emotionally investing in their pregnancy and acknowledging it to others (Moyer et al., 1999; Silvestre & Fresco, 1980). Leifer (1977) found that some pregnant women made conscious efforts to avoid emotional attachment to their fetus until late pregnancy or birth. These women often cited reasons such as fear of miscarriage for the avoidance of bonding with their fetus. Armstrong and Hutti (1998) found that women who had experienced a perinatal loss showed significantly lower levels of prenatal attachment compared with a group of primiparous women of a similar gestational age. However, Armstrong (2002) failed to find group differences in terms of prenatal attachment between those women who had experienced a previous miscarriage and no subsequent deliveries of a healthy infant, those who had history of prior successful pregnancies and those who were pregnant for the first time.

Emotional distance may be increasingly difficult to maintain over the course of the pregnancy. For women who are attempting to maintain emotional distance between themselves and their fetus until the receipt of PDT results, the feeling of fetal movement can be unwanted, disturbing, and conflict intensifying (Katz-Rothman, 1993). Katz-Rothman (1993) found that, of those women who had amniocentesis, almost none were

reassured by fetal movement. Rather, reassurance was provided by the amniocentesis test report. In contrast, fetal movement was comforting and reassuring for women who did not have amniocentesis. They were able to gain reassurance from "the experience of their own bodies and from their developing relationship with their own babies" (Katz-Rothman, 1993, p. 108). Katz-Rothman (1993) states that for those having amniocentesis, "psychologically well-defended women may not feel movement until the existence of a baby – not a chromosomally damaged fetus, but an acceptable *baby* – has been confirmed" (p. 104). Denes (1976) found that women awaiting abortions claimed that their fetuses had not moved even as late as twenty-four weeks gestation. Denes (1976) argued that these women were not lying to her, but rather were in a state of denial regarding the fetus/baby, while simultaneously acknowledging the pregnancy.

Like fetal movement, ultrasound is often a positive experience; parents often felt excited to see the fetus in utero, and feel emotionally closer to it after the procedure (Katz-Rothman, 1993). However, within the context of prenatal testing, the experience of undergoing ultrasound may result in feelings of anxiety. Rapp (1999) reports that some of the women she interviewed felt that seeing the fetus via ultrasound made it seem 'more real' and more like a person, which made it more difficult to maintain emotional distance. Rapp (1999) states that, "even as the sonogram personifies the fetus, the amniocentesis puts its situation into question. Simultaneously distanced and substantiated, the pregnancy is suspended in time and status, awaiting a medical judgement of quality control" (p. 126).

Heidrich and Cranley (1989) found that prior to amniocentesis, women receiving the procedure were less attached to their fetuses (as measured by the MFAS) than were women who were only receiving ultrasound and those not receiving either procedure.

There were no significant post-procedure attachment differences between the groups. Berryman and Windridge (1996) found that pregnant women over 35 years of age had lower levels of attachment at mid-pregnancy as compared to their younger counterparts, but that this effect disappeared by late pregnancy. The authors suggest that this finding is a result of older women fearing their increased risk for fetal chromosomal abnormalities and thus they are more 'tentative' in admitting to feelings of attachment to the fetus. Caccia et al. (1991) found a significant increase in MFAS scores from pre- to post-result receipt for amniocentesis and CVS recipients. This increase in bonding occurred approximately five weeks earlier in women undergoing CVS than in those undergoing amniocentesis, which is consistent with the difference in gestational age at which these procedures are performed. The post-result levels of attachment did not differ significantly between those having amniocentesis and those having CVS, despite "post-result" being five to six weeks later in pregnancy for amniocentesis recipients than CVS recipients. Another study has found that pregnant women who use CVS report significantly greater attachment in the second trimester than those who use amniocentesis (Spencer & Cox, 1988). Prior to receiving test results, women who utilized amniocentesis felt that they were less emotionally attached to their fetuses than other women (Spencer & Cox, 1988). Thus, the literature suggests that amniocentesis has a fundamental impact on maternal prenatal attachment, delaying bonding until receipt of definitive test results. The present study is unique in its examination of the relationship between maternal serum screening and prenatal attachment. Women who have serum screening do not receive definitive results, so the question remains as to whether the test puts them into a limbo of tentative pregnancy that the probabilistic results cannot resolve.

Thus, prenatal bonding has proved to be a construct with much to contribute to the literature regarding the psychology of pregnancy. Another construct whose potential remains largely untapped is fetal health locus of control. Preliminary research suggests that both constructs have implications for health practices during pregnancy.

1.5 Fetal Health Locus of Control

Locus of control has been defined as, "the extent to which people believe they exercise control over their lives (internally controlled) or the degree to which they feel their destinies are beyond their own control and are determined by fate, chance, or powerful others (externally controlled)" (Levenson, 1974, p. 377). Rotter (1966) developed the Internal-External Locus of Control Scale as a unidimensional measure of generalized expectancies regarding locus of control. Early research recognized that generalized measures of locus of control were insufficient for predicting specific behaviours, in particular within the health field (Wallston, Wallston, Kaplan, & Maides, 1976). Therefore, the Health Locus of Control Scale (HLC; Wallston, Wallston et al., 1976) was developed as a unidimensional measure (internal-external) of beliefs regarding the controllability of their one's own health. However, Levenson (1974) proposed a model of locus of control with three dimensions: internal, external-chance, and external-powerful others. Her rationale regarding this distinction was that a person who believes that the world is not ordered (i.e., chance controls their life) will be cognitively and behaviourally different from a person who believes that the world is ordered, but that their life is controlled by others in positions of power. In response to this advancement in theory, Wallston, Wallston, and DeVellis (1978) developed the Multidimensional Health Locus of Control Scale (MHLC) with three subscales: internal, external-powerful others, and external-chance. This scale exhibited improved

psychometric properties over the HLC (Wallston et al., 1978), and has since been used extensively in various areas of health research (e.g., Christensen, Moran, & Wiebe, 1999; Furr & Seger, 1998; Simoni & Ng, 2002).

Health locus of control is related to various health behaviours and attitudes. For example, internal locus of control is positively related to perceived health, positive perceptions of health professionals (McDonald-Miszczak, Maki, & Gould, 2000; Simoni & Ng, 2002), and health-related information seeking (Wallston, Maides, & Wallston, 1976), and negatively related to irrational health beliefs (Christensen et al., 1999) and negative perceptions of health professionals (McDonald-Miszczak et al., 2000). Belief in the control of powerful others over one's health is positively correlated with self-reported medication adherence (McDonald-Miszczak et al., 2000), and negatively correlated with perceived health (Simoni & Ng, 2002) and negative perceptions of health professionals (McDonald-Miszczak et al., 2000). Franco et al. (2000) found that women at risk for ovarian cancer who scored high on the powerful others subscale of the MHLC scale were more likely to comply with their doctors' recommendations. As well, higher scores on the powerful others subscale predicted compliance with doctors' recommendations regarding having a mammogram. Chance locus of control has been found to positively correlate with irrational health beliefs (Christensen et al., 1999) and self-reported medication adherence (McDonald-Miszczak et al., 2000). Results obtained by Steptoe and Wardle (2001) suggest that unhealthy lifestyles may be associated with a greater sense of powerlessness over one's health, as exhibited by beliefs in the roles of chance and powerful others in determining one's health. Thus, research generally seems to support internal health locus of control as being the most adaptive. However,

powerful others locus of control has been found to be positively correlated with compliance with medical recommendations.

Health locus of control has also been examined in relation to attitudes regarding use of prenatal testing. Using a random sample from the general population, Furr and Seger (1998) utilized the MHLC chance and internal subscales in an investigation of the relationship between health locus of control and whether participants would use prenatal genetic testing if they or their partner were pregnant. Furr and Seger found that when demographic characteristics were controlled, locus of control significantly increased the ability to predict prenatal genetic testing attitudes. In particular, the chance subscale was positively associated with stated willingness to undergo testing, and the internal subscale was not significantly related to stated willingness to undergo testing. These counterintuitive results are attributed to the low reliability of the MHLC scale exhibited in the study. Another explanation could be that just as Wallston, Wallston et al. (1976) found that a more specific measure of locus of control was needed for health behaviours, perhaps a more specific measure is needed for pregnancy behaviours. Labs and Wurtele (1986) report that a limitation of general health locus of control scales is that they relate to personal expectancies regarding one's own health. Pregnancy is quite different in this respect, and requires an examination of pregnant women's expectancies regarding the health of their fetuses. Therefore, Labs and Wurtele (1986) developed the Fetal Health Locus of Control Scale (FHLC; Appendix B), which measures internal (FHLC-I), external-chance (FHLC-C), and external-powerful others (FHLC-P) dimensions of locus of control as they relate to maternal health behaviour.

1.5.1 Fetal health locus of control and health behaviours. It is well recognized that a pregnant woman's health related behaviours (e.g., consumption of alcohol, drug

use, nutrition, etc.) can have a substantial impact on the health of her future child (Moore & Persaud, 1998). Labs and Wurtele (1986) report that the FHLC scale may be helpful in identifying "patients who do not have strong beliefs concerning their personal role in determining the health of their unborn children" (p. 818). Labs and Wurtele (1986) suggest that women lacking strong internal beliefs may put the health of their unborn children at risk. This proposition has been supported by subsequent research.

Tinsley, Trupin, Owens, and Boyum (1993) used the Pregnancy Belief Scales that they developed based on the MHLC to investigate the relationship between health behaviours and locus of control. They found that internal locus of control was negatively correlated with use of street drugs, cigarettes, use of non-prescription drugs, and protein intake among pregnant women as reported by physicians. In a later study (Reisch & Tinsley, 1994) using the same measure, number of prenatal visits was found to be negatively correlated with internal maternal locus of control and positively with external-powerful others maternal locus of control among a sample of impoverished women. The authors argue that these findings are congruent with the notion that people who are unable to escape poverty may, in reality, face a lack of personal control over their environment, and therefore, their only source of control is through the influence of powerful others.

Generally, the FHLC-I has been found to be positively related to positive health behaviours and negatively related to negative health behaviours. The FHLC-P has exhibited either positive associations with positive health behaviours or non-significant correlations with health behaviours. The FHLC-C has generally exhibited either non-significant correlations with health behaviours or has been positively associated with negative health behaviours. Using the FHLC scale, Stewart and Cecutti (1993) found

that abused women were more likely than non-abused women to think that chance affected their fetuses' health and less likely to believe in the effect of their own internal control. Walker, Cooney, and Riggs (1999) report that the FHLC-I is predictive of women's first-trimester scores on the Self Care Inventory (Pardine, n.d.; as cited in Walker et al., 1999), which measures both positive and negative health behaviours (e.g., substance abuse, healthy eating, recklessness, hygiene, sleep/rest, and exercise). Haslam et al. (2003) found those who scored higher on the FHLC-I were more likely to take vitamin/iron supplements and to breastfeed postpartum. Labs and Wurtele (1986) have found that pregnant women with a more internal fetal health locus of control are more likely to attend childbirth classes. Those with higher internal FHLC have also been found to be less likely to smoke (Haslam et al., 2003; Labs & Wurtele, 1986) and consume caffeine (Labs & Wurtele, 1986). Stewart and Streiner (1995) found that all three subscales of the FHLC were predictive of cigarette smoking; smokers were more likely to believe in chance, and less likely to believe that internal control or powerful others affected their fetuses' health. Stewart and Streiner (1994) report that women who drank more than seven standard drinks per week were more likely to score higher on the FHLC-C and lower on the FHLC-I and FHLC-P than those who drank less. Stewart and Streiner (1995) state that "these attitudes clearly do not facilitate good health in general . . . and it would be helpful if techniques could be found to modify these beliefs" (p. 605). However, Stewart and Cecutti (1993) also state that a woman who believes that her behaviour has little effect on the health of her fetus, and rather that it is controlled by chance, will have low motivation to change these maladaptive behaviours. This is of particular concern as previous research has found belief in the role of chance to be significantly higher among women who have experienced miscarriages (Bielawska-

Batorowicz, 1993), delivery complications, or medical complications during pregnancy (Reisch & Tinsley, 1994; Spirito, Ruggiero, McGarvey, Coustan, & Low, 1990) than among those who have not. Perhaps such complications reinforce the lack of control that exists over the final outcome of a pregnancy, thus supporting an attitude of learned helplessness.

The encouragement of an internal locus of control, rather than of total reliance on health professionals as experts may be beneficial. Fuller (1990) states that the instruction given to prospective parents by health professionals often creates an atmosphere of the professional as "expert," and the mother as not knowing or understanding her child's characteristics and capabilities. She suggests that discussions should, rather, be based upon the mother as having unique knowledge of the child, as she has developed a relationship with the child over the course of pregnancy and childbirth.

To date, no studies have examined the relationship between FHLC and prenatal testing use or willingness to use prenatal testing. However, anecdotal accounts from women support the existence of, and illustrate in practical terms, these alternate loci of control in that while waiting for their PDT results, "some women . . . bargain with themselves, some with their gods or fate, and some with their doctors" (Katz-Rothman, 1993, p. 265).

1.5.2 Internal locus of control and prenatal testing. As discussed previously, women who believe that they control the health of their fetus are more likely to engage in a variety of health-related behaviours. Prenatal testing may be seen by these women as a part of prenatal care, and thus be perceived as a health promoting behaviour. Lawson and Stolz (2002) found that endorsement of reproductive autonomy values (as opposed to values which favour public health needs) is strongly predictive of willingness

to use prenatal testing. As it is likely that women who strongly believe in their own control over their fetus' health will also tend to believe in the value of independent decision making regarding prenatal testing, one could postulate that women who have utilized prenatal testing would score higher on the FHLC-I than those who have not.

1.5.3 Powerful others locus of control and prenatal testing. Bielawska-Batorowicz (1993) found that the number of elective abortions a pregnant woman had previously was positively correlated with beliefs in the role of powerful others in their fetus' health. This finding was contrary to the study's hypothesis that women who had previous abortions would score higher on the FHLC-I than those who had not. Bielawska-Batorowicz (1993) suggests that although the women decided to abort, medical professionals 'made things happen,' and thus powerful others control the process. This suggests that although women may choose whether or not to undergo prenatal testing, medical professionals control the procedure, and thus use of prenatal testing may be positively related to a powerful others fetal health locus of control.

Previous research has found that medical professionals are almost always in favour of prenatal testing, and may not even present it as a choice for high-risk women, but rather as a necessity or a standard part of prenatal care (Katz-Rothman, 1993; Marteau, Plenicar, & Kidd, 1993). In fact, one study that purports to explore "decision making regarding amniocentesis" states that by being aware of the characteristics that differentiate women who want, do not want, or are unsure whether they want amniocentesis, genetic counsellors can "focus on the factors that might help the No/Unsure individuals to more accurately consider genetic amniocentesis" (French, Kurczynski, Weaver, & Pituch, 1992, p. 183). The assumption is implicit – women who have chosen not to undergo prenatal testing are obviously making a faulty decision.

French et al. (1992) found that women's health beliefs regarding amniocentesis were more predictive of uptake than their level of knowledge about the procedure. These authors state that a physician's attitude toward prenatal testing is important in the formation of these health beliefs. Thus, it is likely that women who feel that their physician controls the health of their fetus would undergo prenatal testing.

1.5.4 Chance locus of control and prenatal testing. Among community samples, self-defined religiosity has been found to be predictive of willingness to use PDT in the event of a future pregnancy (Furr & Seger, 1998; Lawson, 2001). Those who perceived themselves as more religious were less likely to indicate a willingness to use PDT. As the FHLC-C subscale measures belief in the role of chance, fate, and God in determining the health of one's fetus, it is likely that those who score high on this subscale are more religious, and thus less likely to use prenatal testing.

Through the use of qualitative interviews, Rice and Naksook (1999) found that some Thai women felt that they should not receive ultrasound scans because they felt that their pregnancy's outcome would be decided by fate and nature, known as *wenkam* in Thai culture. Women who believed in wenkam but decided to make use of ultrasound felt that they would not terminate the pregnancy even if the results showed an abnormality. This suggests that women who believe in chance may believe that nature and fate alone control the health of their unborn child, and therefore it is futile to undergo prenatal testing.

1.6 Attitudinal/Demographic Variables and Prenatal Testing

In addition to the previously discussed psychological constructs, research has shown that certain attitudinal and demographic variables are related to prenatal testing use or stated willingness to use prenatal testing. As discussed previously, studies using

community samples have found self-defined religiosity to be predictive of willingness to use PDT in the event of a future pregnancy. Those who perceived themselves as more religious were less likely to indicate a willingness to use PDT. Attitude toward abortion has been a consistent predictor of attitudes toward prenatal genetic testing (Browner, Preloran, & Cox, 1999; Furr & Seger, 1998; Singer, 1991; Wertz, Janes, Rosenfield, & Erbe, 1992), with those less accepting of abortion being less likely to intend to use PDT.

Browner et al. (1999) failed to find a relationship between previous obstetrical history and use of PDT; however, their study involved a very specific sub-sample of the American population (women of Mexican origin). Halliday, Lumley, and Watson (1995) found that women in their fourth or subsequent pregnancy were less likely than those in their first, second, or third pregnancy to accept amniocentesis or CVS. Heyman and Henriksen (2001) found that women of lower parity were less likely to accept amniocentesis. Although these results may seem contradictory at first glance, it is possible that they are not. These studies indicate that perhaps there is a relationship between pregnancy success and use of prenatal testing. Women who have had more difficulty carrying a pregnancy to term, or who have undergone previous abortions (i.e., several pregnancies but few children) may be less willing to use prenatal testing, which would involve risking the pregnancy and risking being put in a position whereby they must choose whether or not to terminate it.

1.7 Objectives

The two central objectives of this study were (a) to examine how prenatal attachment, fetal health locus of control, and various attitudinal and demographic variables are related to prenatal testing status (i.e., no testing, serum screening, or amniocentesis); and (b) to examine the impact of prenatal testing status and fetal health

locus of control on prenatal emotional attachment. Additionally, it was hoped that this research would provide additional evidence of the reliability of the FHLC subscales and the PAI.

1.8 Possible Benefits

The objective of this research is to provide concrete data relating to the psychosocial implications of prenatal testing in order to guide future research, the design of counselling protocols for use in clinics offering prenatal testing, and the development of future policies regarding prenatal testing. The multi-factorial approach of the study will enable the identification of relationships between several aspects of women's views of their relationship with their unborn child and prenatal testing use. The study also aims to provide insight into the association between attachment to the fetus and health beliefs as encompassed by the Fetal Health Locus of Control Scale (Labs & Wurtele, 1986). This may assist in future initiatives designed to promote health behaviours among pregnant women. Additionally, this research forms the basis for future studies to investigate the relationship between prenatal attachment, fetal health locus of control, and prenatal testing in more detail.

2. HYPOTHESES

2.1 Prenatal Emotional Attachment Hypothesis

2.1.1 Predictors of prenatal emotional attachment

1. Prenatal testing status, Internal Fetal Health Locus of Control and Powerful Others Fetal Health Locus of Control will be related to and predictive of prenatal emotional attachment (PAI).

As discussed previously, Katz-Rothman (1993) argues that women undergoing prenatal testing must maintain emotional distance from their fetus in order to ensure that they are prepared to abort, should abnormalities be found. The relationship between delayed bonding until the receipt of definitive PDT results (i.e., through amniocentesis or CVS) has been supported by quantitative research (Caccia et al., 1991; Heidrich & Cranley, 1989). Women who have solely undergone serum screening have only ambiguous information regarding the presence of genetic or neural tube abnormalities of their fetus. Therefore, it is hypothesized that women who have not utilized prenatal testing or who have undergone amniocentesis and received favourable results will tend to have stronger emotional attachment to the fetus (PAI) than those who have undergone serum screening only.

To date, there have been no studies that directly link prenatal emotional attachment and fetal health locus of control. Thus, this portion of the hypothesis is largely exploratory. However, as discussed previously, internal and powerful others fetal health loci of control (e.g., Labs & Wurtele, 1986; Stewart & Streiner, 1994) and maternal-fetal prenatal attachment (Condon, 1988; Lindgren, 2001) have been found to correlate with positive health behaviours during pregnancy. Thus, it is predicted that

internal and powerful others locus of control will be positively correlated with and predictive of maternal-fetal emotional attachment.

2.2 Prenatal Testing Status Hypotheses

2.2.1 Internal Fetal Health Locus of Control and prenatal testing

2. Women who have undergone amniocentesis and/or serum screening will tend to have stronger beliefs in their own role (FHLC-I) in determining the health of their fetus than those who have not undergone prenatal testing.

As discussed previously, no studies have directly examined the relationship between use of prenatal testing and internal locus of control. Thus, this hypothesis is largely exploratory. It is expected that women with stronger beliefs in their own role in determining the health of their fetus will undergo prenatal testing, having perceived it as part of prenatal care and thus a health promoting behaviour. Thus, it is predicted that women who have undergone prenatal testing will score higher on the FHLC-I than those who have not.

2.2.2 Powerful Others Fetal Health Locus of Control and prenatal testing

3. Women who have undergone amniocentesis and/or serum screening will tend to have stronger beliefs in the role of health professionals (FHLC-P) in determining the health of their fetus than those who have not undergone prenatal testing.

Previous research that shows that powerful others orientation is related to adherence with physicians' recommendations (Franco et al., 2000; McDonald-Miszczak et al., 2000), and that physicians are likely to recommend prenatal testing to high-risk women (Katz-Rothman, 1993; Marteau et al., 1993). Thus, it is hypothesized that women who believe that their physician controls the health of their child (FHLC-P) will

be more likely to undergo prenatal testing (i.e., amniocentesis or maternal serum screening).

2.2.3 Chance Fetal Health Locus of Control and prenatal testing

Due to the lack of research regarding the relationship between chance locus of control and medical testing, the relationship between these variables will be examined in an exploratory fashion.

2.2.4 Attitudinal variables

Based on previous research, it is hypothesized that:

(a) Those who have not undergone prenatal testing will tend to have a less favourable attitude toward abortion than those who have undergone prenatal testing (i.e., those in the amniocentesis and serum screening groups); and

(b) Those who have not undergone prenatal testing will tend to rate their religious beliefs as stronger than those who have undergone prenatal testing (i.e., those in the amniocentesis and serum screening groups).

2.3 Exploratory Research Questions

(a) Does having experienced a previous miscarriage or abortion relate to prenatal testing use in one's current pregnancy?

(b) Does having experienced a previous miscarriage or abortion relate to prenatal emotional attachment in one's current pregnancy?

3. METHOD

3.1 Participants

The participants in this study were pregnant women who, due to advanced maternal age (i.e., 35 years of age or older at the time of delivery) are categorized as high risk for fetal anomaly, and thus were eligible for prenatal testing. Participants were invited to participate any time after the first fifteen weeks of their pregnancy.

Ninety-one pregnant women participated in the study, 95.6% of whom were married or common-law. See Table 1 for further demographic information.

In their current pregnancy, 35 participants (38.5%) had no testing, 27 participants (29.7%) had serum screening, and 29 participants (31.9%) had amniocentesis. Women who had no testing had no plans to have prenatal testing during their current pregnancy. Women in the serum screening group had no plans to have amniocentesis during their current pregnancy. It is likely that all participants would have had a routine ultrasound as part of their prenatal care.

Eighty-three participants selected "yes" in response to the question, "Have you and your physician discussed the option of prenatal testing?". In order to ensure that the remaining eight women had self-selected into each of the three testing groups, and as such were informed of their options, their qualitative responses to questions regarding the information provided by their physician were examined. The responses of seven of these women revealed that a discussion had in fact taken place with their physician (which the participant may or may not have perceived as being satisfactory), and/or the women had researched prenatal testing on their own, and had made their decision prior to meeting with their physician. One woman failed to respond.

The questionnaire did not include an item that asked whether women who underwent amniocentesis or serum screening were in receipt of their test results. However, participants who underwent serum screening ranged from 16 weeks gestation to full term, and thus likely would have all received results prior to completing the questionnaire. Participants who underwent amniocentesis ranged from 17 weeks gestation to full term, and thus were all at or beyond the gestational age at which results may be available.

Table 1

Demographic Characteristics by Testing Group

Characteristic	No testing n = 35	Serum screening n = 27	Amniocentesis n = 29	Significance* (p =)
Age (years)				
M (*SD*)	35.9 (2.9)	36.3 (2.2)	38.2 (2.1)	.001
Gestation (weeks)				
M (*SD*)	28.3 (5.9)	27.3 (7.8)	28.1 (7.1)	.859
Race				
Caucasian	32 (91%)	25 (93%)	27 (93%)	--
Asian	1 (3%)	2 (7%)	0	
First Nations	1 (3%)	0	1 (3%)	
Other	1 (3%)	0	1 (3%)	
Number of children				
M (*SD*)	0.9 (1.1)	0.9 (0.9)	1.0 (1.1)	.900
Number of previous pregnancies				
M (*SD*)	1.9 (1.8)	1.6 (1.7)	1.6 (1.5)	.754

Note: Due to rounding error percentages may not add to 100.

*One-way ANOVAs

3.2 Measures

The following measures were part of a larger questionnaire examining women's attitudes and experiences of prenatal testing. Two versions of the questionnaire were utilized; after the first printing, additional demographic questions were added as described below (see Appendix C). Fourteen participants (15%) responded using the first version.

3.2.1 Prenatal emotional attachment. Emotional attachment to the fetus was examined using the 21-item Prenatal Attachment Inventory (PAI; Muller, 1993; Appendix A). This scale is designed to assess "the unique, affectionate bond that develops between a woman and her fetus" (Muller, 1993, p. 201). Responses to the PAI are made on a four-point likert scale, and scores may range from 21 to 84 with higher scores indicating increased attachment quality/intensity. Total PAI scores for each respondent are calculated by summing the responses to each question. None of the items are reverse scored.

Cronbach's alpha values for the total scale have ranged from .85 (Muller, 1996), to .86 (Siddiqui & Haeggloef, 2000; Siddiqui, Haeggloef, & Eisemann, 1999), to .89 (Gau & Lee, 2003). A study using confirmatory factor analysis supported the unidimensional structure of the PAI (Gau & Lee, 2003). In the present study, Cronbach's alpha for the PAI was .86. The PAI has been shown to have concurrent validity with a previously developed measure of maternal prenatal attachment, the MFAS (r = .72, Muller, 1993; Damato, 2000), and with midwives' ratings of overall prenatal attachment (Siddiqui et al., 1999). Damato (2000) has found significant correlations between PAI scores and gestational age (r = .30) and fetal movement (r = .28), suggestive of construct validity. Within the present study, prenatal emotional

attachment to the fetus and gestational age were significantly positively correlated, r (91) = .25, p = .017.

3.2.2 Fetal health locus of control. The Fetal Health Locus of Control Scale (FHLC; Labs & Wurtele, 1986; Appendix B) was used to examine an internal dimension, women's beliefs regarding their own responsibility for the health of the unborn child (FHLC-I), as well as two external dimensions – chance factors (FHLC-C) and the role of health professionals (FHLC-P). Responses to each question are made on a nine-point likert scale, and scores on each subscale may range from 0 to 54 with higher scores indicating stronger belief in the respective locus of control. Total scores are calculated for each FHLC subscale by summing the responses to the questions on each respective subscale. None of the items on the FHLC are reverse scored. Labs and Wurtele (1986) found that in a sample of pregnant women, all of the scale's 18 items (six items per dimension) had factor loadings of at least .50 on their respective factors (i.e., dimension). Using a sample of introductory psychology students, Labs and Wurtele found test-retest reliabilities over a two-week interval of .80 for the FHLC-I, .86 for the FHLC-C, and .67 for the FHLC-P. Using the same sample, Cronbach's alpha coefficients were .88 for the FHLC-I, .83 for the FHLC-C, and .76 for the FHLC-P. Using a sample of pregnant women, Walker et al. (1999) report Cronbach's alphas for the internal, chance, and powerful others subscales of .75, .80, and .76, respectively. Within the present study, Cronbach's alpha coefficients for each subscale were .65 for the FHLC-I, .73 for the FHLC-C, and .78 for the FHLC-P. Also within the present study, FHLC-C was significantly correlated with religiosity, r (90) = .28, p = .007, which is suggestive of construct validity.

3.2.3 Prenatal testing status. Women completing the questionnaire were asked to indicate whether they had undergone prenatal testing in their current pregnancy, and based on their responses, they were classified into one of three groups: those who underwent amniocentesis, those who underwent serum screening, and those who received no testing. Women who indicated that they had only received "ultrasound" or "blood work" were included in the no testing category.

Participants also supplied information regarding their past history with prenatal testing. Specifically, they were asked what types of prenatal testing, if any, they received during previous pregnancies. Participants completing the second version of the questionnaire were also asked whether they received a diagnosis via testing and, if so, to indicate the outcome of the pregnancy.

3.2.4 Demographic variables. Participants were asked to supply information on various demographic variables such as maternal age, gestational age (in weeks), marital status, race, number of previous pregnancies, and number of children. Subjective importance of parenting was answered using a five-point likert scale ranging from "not at all" to "extremely." Participants completing the second version of the questionnaire were also asked to indicate number of previous abortions and miscarriages.

3.2.5 Strength of religious beliefs. Strength of religious beliefs was a one-item measure, "Please rate the strength of your religious beliefs", which was answered using a five-point likert scale ranging from "not at all" to "extremely." This item was selected to measure religiosity based on the seeming face validity of the item. Additional evidence of the item's validity is evident in that it exhibited a positive correlation with less favourable attitudes toward abortion, r (90) = .69, p = .000, and with the Chance subscale of the FHLC, r (90) = .28, p = .007.

3.2.6 Attitude toward abortion. Attitude toward abortion was comprised of four questions that were answered in a five-point likert scale ranging from "strongly disagree" to "strongly agree." Attitude toward abortion was calculated as the sum of four questions: two reverse scored items ("it is a woman's choice whether or not to continue a pregnancy" and "abortion is a personal decision") and two non-reverse scored items ("a woman should never have an abortion" and "abortion is wrong in any circumstance"). Therefore, higher scores reflect a less favourable attitude toward abortion. In the present study the Cronbach's alpha coefficient for the Attitude toward Abortion Scale was .83.

3.3 Procedure

Initially, physicians in Saskatoon and Regina were recruited to distribute questionnaires to their patients who met the study criteria. However, due to the slow rate of response achieved by this methodology, the recruitment strategy was altered. Informational posters were placed in physician offices (including General Practitioners and Obstetricians/Gynecologists), testing labs and various community locations (e.g., health centres, maternity stores, gyms) in Saskatoon, Regina, and Winnipeg. Women who were interested in participating contacted the researcher, and a survey package was mailed to them if they met the criteria for participation. The survey package contained a letter introducing the study (Appendix D), a questionnaire booklet (see Appendix E for the questionnaire booklet introduction), and a stamped self-addressed return envelope. Women were provided with a $10 honorarium for their participation. As women who responded via the latter methodology self-selected at the point of viewing the poster, the response rate was high; of 74 surveys mailed, 71 were returned (96%). As surveys were

returned anonymously by mail, the researchers were unable to determine which women had self-selected for participation versus those who were recruited by their physicians.

4. RESULTS

4.1 Scale Properties and Inter-correlations

Table 2 contains scale and item means and standard deviations for each respective prenatal testing group. Additionally, analyses were conducted to ensure that the differences observed between the testing groups in terms of prenatal attachment were consistent with the present study's hypothesis, namely that the only groups that would not differ significantly would be the amniocentesis and no testing groups. The omnibus test of group differences did not reveal significant between group differences, F (2, 88) = 2.32, p = .104. However, Howell (1997) argues that an insignificant omnibus test need not be prohibitive of performing individual comparisons. He states that the omnibus F distributes between group differences across the number of degrees of freedom for groups, which in effect dilutes the overall F in situations where several group means are equal to each other (i.e., the amniocentesis and no testing groups) but different from some other mean (i.e., the serum screening group). Howell further argues that requiring overall significance results in overly conservative comparisons (i.e., reduction of the familywise error rate), as the tests were designed and their significance levels established without regard for overall F. Based on these arguments, and previous research that supports the hypothesis that the amniocentesis and no testing groups would not differ, individual t-tests were used to compare the amniocentesis and no testing groups, t (62) = .61, p = .546; amniocentesis and serum screening groups, t (54) = -1.93, p = .059; and serum screening and no testing groups, t (60) = -1.76, p = .084. Thus, consistent with expectations, marginally significant differences were observed between

the serum screening group and both the amniocentesis and no testing groups. No such differences were observed between the amniocentesis and no testing group.

Table 2

Scale/Item Means and Standard Deviations by Testing Group

Scale	No testing n = 35		Serum screening n = 27		Amniocentesis n = 29	
PAI						
M (*SD*)	57.1	(7.7)	53.5	(8.7)	58.6	(10.8)
FHLC-I						
M (*SD*)	42.5	(6.3)	43.2	(6.2)	44.2	(7.0)
FHLC-C						
M (*SD*)	30.2	(9.8)	28.7	(8.9)	28.1	(11.8)
FHLC-P						
M (*SD*)	19.9	(9.5)	18.0	(8.3)	19.1	(9.7)
Subjective importance of parenting						
M (*SD*)	4.8	(0.5)	4.6	(0.5)	4.7	(0.5)
Religiosity						
M (*SD*)	3.4	(1.1)	2.9	(1.2)	2.7	(1.2)
Attitude toward abortion						
M (*SD*)	9.7	(4.5)	8.0	(4.5)	7.0	(3.5)

Table 3 contains the correlations between each respective scale. Results supported the hypothesis that internal fetal health locus of control (FHLC-I) and prenatal bonding, as measured by the PAI, are significantly correlated, r (91) = .46, p = .000. Results also supported the hypothesis that scores on the Powerful Others subscale of the FHLC and PAI scores would be significantly correlated, r (91) = .37, p = .000. An exploratory correlational analysis was conducted to investigate the relationship between

prenatal bonding and chance fetal health locus of control. PAI scores were marginally correlated with scores on the FHLC Chance subscale, r (91) = .20, p = .058.

Unlike Labs and Wurtele (1986) who found no significant intercorrelations between the FHLC subscales, in the present study FHLC-P scores were significantly correlated with both FHLC-I, r (91) = .44, p = .000, and FHLC-C scores, r (91) = .32, p = .002.

Table 3

Correlations

	PAI	FHLC-I	FHLC-C	FHLC-P	Subjective importance of parenting	Religiosity
PAI						
FHLC-I	.459**					
FHLC-C	.199	-.049				
FHLC-P	.366**	.441**	.317**			
Subjective importance of parenting	.089	-.069	.149	-.006		
Religiosity	.269*	.087	.283**	.228*	.219*	
Attitude toward abortion	.242*	-.002	.410**	.188	.259*	.694**

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

4.2 Predictors of Prenatal Emotional Attachment.

A hierarchical regression was conducted in which age, gestational age, abortion attitudes, the Fetal Health Locus of Control-Internal and Powerful Others subscales, and testing status were regressed on Prenatal Attachment Inventory scores (see Table 4). As previously discussed (see section 4.1), between group differences in prenatal emotional attachment only exist for the serum screening group versus the other two testing groups;

therefore the amniocentesis and no testing groups were collapsed for the purpose of this analysis. Religiosity was not included within the analysis due to its potential collinearity with abortion attitudes, r (90) = .69, p = .000.

After the final step, with all the variables in the equation, R = .594, F (6, 84) = 7.62, p = .000. Given that the relationship between gestational age and prenatal emotional attachment has already been established, and given the limited practical utility of predicting prenatal emotional attachment based on gestational age, this variable was entered in the first step of the regression. Maternal age was also entered into the first step of the regression to control for between group differences in maternal age. Attitude toward abortion was entered in the first step of the regression in order to control for any effects the variable may have on prenatal emotional attachment before the introduction of testing status in step three. Following the introduction of gestational age, attitude toward abortion, and maternal age, R was significantly different from zero, R^2 = .117, F (3, 87) = 3.83, p = .013. However, an examination of the beta weights revealed that none of the variables alone were significant predictors; gestational age and less favorable attitudes towards abortion were only marginally related to higher levels of prenatal attachment, p = .067 and p = .067, respectively, and maternal age did not significantly predict prenatal attachment, p = .206.

The addition of FHLC-I and FHLC-P on the second step resulted in a significant increase in R, R^2_{chg} = .203, F_{chg} (2, 85) = 12.67, p = .000. An examination of the beta weights revealed that FHLC-I was significantly positively predictive of prenatal attachment p = .001, and that FHLC-P was only marginally positively predictive of prenatal attachment p = .099.

The addition of testing status (serum screening vs. amniocentesis and no testing) on the third step resulted in a significant increase in R, $R^2_{chg} = .033$, F_{chg} (1, 84) = 4.31, $p = .041$. Specifically, women who underwent serum screening evidenced lower levels of attachment to the fetus than women who had either amniocentesis or no testing. Thus, results suggest that participants who received definitive information regarding their fetus' health (i.e., through amniocentesis) or no information (i.e., no testing) felt more prenatal emotional attachment to their fetus than those who had only received partial information (i.e., through serum screening). In the final regression analysis Fetal Health Locus of Control-Internal ($sr^2 = .100$) and current testing status ($sr^2 = .033$) contributed significantly toward the prediction of prenatal emotional attachment.

Table 4

Hierarchical Regression

	B	β	sr^2
STEP 1			
Weeks gestation	.261	.193	n.s.
Attitude toward abortion	.409	.191	n.s.
Age	.451	.130	n.s.
STEP 2			
FHLC-I	.526	.371**	.100
FHLC-P	.172	.171	n.s.
STEP 3			
Testing status	3.698	.184*	.033
			$R^2 = .35$
			Adjusted $R^2 = .31$
			$R = .59$

* Significant at the 0.05 level.
** Significant at the 0.01 level.

4.3 Fetal Health Locus of Control and Prenatal Testing

Stronger beliefs in one's own role (FHLC-I) and the role of health professionals (FHLC-P) in determining the health of one's fetus were predicted to be positively related to prenatal testing uptake. These hypotheses were not supported. ANOVAs revealed that FHLC-I scores did not differ significantly between the no testing (M = 42.5), serum screening (M = 43.2), and amniocentesis groups (M = 44.2), F (2, 88) = .55, p = .578; and FHLC-P scores did not differ significantly between the no testing (M = 19.9), serum screening (M = 18.0), and amniocentesis groups (M = 19.1), F (2, 88) = .30, p = .740. The relationship between the role of chance/fate in determining the health of one's fetus (FHLC-C) and prenatal testing was examined in an exploratory fashion. FHLC-C scores did not differ significantly between the no testing (M = 30.2), serum screening (M = 28.7), and amniocentesis groups (M = 28.1), F (2, 88) = .33, p = .721.

4.4 Other Analyses

4.4.1 Prenatal testing and attitudinal/demographic variables. Significant between group differences were found in terms of attitude toward abortion, F (2, 88) = 3.33, p = .041. Less favourable attitudes toward abortion were found among participants who had not undergone prenatal testing (M = 9.7) than among those who underwent amniocentesis (M = 7.0), p = .039. Attitudes toward abortion did not differ significantly between the serum screening group (M = 8.0) and the no testing and amniocentesis groups. Thus, the hypothesis that those who had not undergone prenatal testing would tend to have a less favourable attitude toward abortion than those who had undergone prenatal testing was partially supported.

The hypothesis that those who had not undergone prenatal testing would tend to rate their religious beliefs as stronger than those who had undergone prenatal testing was

also partially supported. The testing groups differed significantly in terms of their self-defined religiosity, F (2, 87) = 3.27, p = .043, with the no testing group having marginally stronger religious beliefs (M = 3.4) than the amniocentesis group (M = 2.7), p = .058. Religiosity did not differ between the serum screening group and both the no testing and amniocentesis groups.

Significant between group differences were also found in terms of maternal age, F (2, 88) = 7.17, p = .001. Women who underwent amniocentesis were older (M = 38.2) than either those who underwent serum screening (M = 36.3), p = .018 or no testing (M = 35.9), p = .001 who did not differ significantly from one another.

Significant differences were not found between the no testing, serum screening, and amniocentesis groups in terms of gestational age, F (2, 88) = .15, p = .859; importance of parenting, F (2, 87) = 1.35, p = .264; and number of children, F (2, 87) = .11, p = .900.

4.4.2 Reproductive history. Seventeen participants reported undergoing prenatal testing in a previous pregnancy, 10 of whom had amniocentesis and 7 of whom had serum screening. Two participants received a diagnosis of fetal disease or disability in a previous pregnancy and both of these women terminated the pregnancy. All women who had prenatal testing in a previous pregnancy had prenatal testing again in their current pregnancy.

Seventy-seven participants completed the second version of the questionnaire, which included items regarding miscarriages and abortions. Of these participants, 12 (16%) indicated they had a previous abortion; nine participants had one previous abortion, and three participants had two or three abortions. Twenty-six participants

(35%) indicated they had a previous miscarriage; 13 participants had one, 10 had two, and 2 had three or four miscarriages.

Two separate 2 x 3 chi-squares were used to test the relationship between reproductive history (previous miscarriage or abortion) and current testing status; no significant relationships were found, χ^2 (2, N = 75) = .81, p = .666 and χ^2 (2, N = 77) = .09, p = .954, respectively. Thus, in response to the research question regarding the impact of previous miscarriages or abortions on prenatal testing uptake, the present study failed to find a relationship between these variables.

The research question regarding the nature of the relationship between previous miscarriages or abortions and prenatal emotional attachment produced interesting findings. Women who had previous miscarriages were found to have significantly higher PAI scores (M = 59.3) than those who had not (M = 54.4), t (73) = -2.19, p = .032. PAI scores did not differ based on whether participants had a previous abortion, t (75) = .43, p = .672. The relationship between the FHLC subscales and previous unsuccessful pregnancies was examined in an exploratory fashion. FHLC-I, FHLC-P, and FHLC-C scores did not differ based on whether participants had a previous miscarriage, t (73) = -0.26, p = .794; t (73) = -1.02, p = .310; and t (73) = -1.26, p = .213, respectively. FHLC-I, FHLC-P, and FHLC-C scores also did not differ based on whether participants had a previous abortion, t (75) = 0.15, p = .883; t (75) = -0.04, p = .965; and t (75) = 0.02, p = .982, respectively.

5. DISCUSSION

> *The technological revolution in reproduction is forcing us to confront the very meaning of motherhood, to examine the nature and origins of the mother-child bond* (Katz-Rothman, 1993, p.3)

The main purpose of this study was to examine the relationship between prenatal testing status (i.e., no testing, serum screening or amniocentesis), prenatal attachment, and fetal health locus of control. Taken together, clinically relevant results emerged from the analysis of predictors of prenatal attachment in that prenatal testing status and beliefs about one's own role in determining the health of the fetus were predictive of prenatal attachment scores.

The finding that prenatal testing status was a significant predictor of prenatal emotional attachment lends additional support to the contention that prenatal testing does in fact alter maternal-fetal bonding and the experience of pregnancy. Those who underwent amniocentesis or no prenatal testing tended to exhibit stronger emotional attachment to their fetuses than those who underwent serum screening. Those who have only undergone serum screening are in the midst of what Katz-Rothman (1993) would term a "tentative pregnancy," having not received definitive information regarding the health of their fetus and therefore delaying feelings of emotional attachment. Both women who receive maternal serum screening and those who receive amniocentesis are placed in the situation of having to contemplate the possibility that their child has a disability, but serum screening does not provide the conclusive results needed to move

women beyond the need to maintain emotional distance. Katz-Rothman states that prenatal testing has enormous repercussions for the mother-fetus relationship:

> A diagnostic technology that pronounces judgments halfway through the pregnancy makes extraordinary demands on women to separate themselves from the fetus within. Rather than moving from complete attachment through the separation that only just begins at birth, this technology demands that we begin with separation and distancing. Only after an acceptable judgment has been declared, only after the fetus is deemed worthy of keeping, is attachment to begin. (p. 114)

Although amniocentesis can provide 'an acceptable judgment,' serum screening cannot supply such a declaration. Thus there is no judgment that deems the fetus worthy of keeping and so attachment is further delayed.

The present study raises the question: does undergoing only serum screening have long-term repercussions for the mother-fetus relationship? The questionnaire did not include an item that asked whether women were in receipt of their test results, but judging by the average gestational age, both participants who underwent serum screening and those who underwent amniocentesis would have received results prior to completing the questionnaire. Therefore, given that these women were still exhibiting a lower level of prenatal bonding and gestational age was controlled for across the three testing groups, there may be post-result implications for women who choose not to proceed with more invasive forms of prenatal testing (i.e., amniocentesis). If low levels of prenatal attachment persist post-serum screen result, this has much larger implications for the field of obstetrics than if levels approach those of the other groups once results are received. Undergoing serum screening may have serious negative consequences for

the prenatal attachment experience, and perhaps for future mother-infant attachment. Having undergone only serum screening, women are left with uncertain and partial information. Further research is required to determine how long into pregnancy these effects persist, and whether there are implications for the mother-infant bond and for bonding in subsequent pregnancies.

Feelings of personal control over the health of one's fetus were also predictive of prenatal bonding; women who felt personal control over the health of their fetus were more likely to begin to build a close, affective relationship with their fetus during pregnancy. Perhaps feelings of self-efficacy as reflected by an internal locus of control extend beyond the "fetal health" sphere, and into one's ability to interact with the baby while in utero.

Relationships between traditional measures of "adult attachment" and locus of control have been suggested, but little empirical evidence of the association exists. Ainsworth (1991, as cited in Crowell & Treboux, 1995) suggests that secure attachment relationships in adult life facilitate competence and mastery outside the relationship. Weiss (1982, p. 173, as cited in Crowell & Treboux, 1995, p. 298) suggests "that attachment figures in adult life need not be protective figures, but rather they can be seen as 'fostering the attached individual's own capacity for mastering challenge'" (p. 173). These statements are suggestive of a relationship between secure attachment and internal locus of control, both of which may be viewed as promoting resilience. This suggests that maternal-fetal attachment would facilitate feelings of personal control over the pregnancy.

In addition to internal fetal health locus of control, a positive correlation was also found between powerful others fetal health locus of control and prenatal attachment.

However, it is important to note that FHLC-P was only marginally predictive of attachment in the regression after gestational age, attitude toward abortion, and maternal age had been controlled for. Past research has found that both prenatal attachment and internal and powerful others FHLC correlate with healthier lifestyles during pregnancy (Attachment: Condon, 1988; Lindgren, 2001; FHLC: Haslam et al., 2003; Labs & Wurtele, 1986; Stewart & Streiner, 1994, 1995; Walker et al., 1999). Condon (1986) suggests that women who feel less emotional attachment to their fetus may have more difficulty subjugating their own needs to those of their fetus. The items on the FHLC-I subscale reflect personal practices that by their very nature reflect subjugation of personal needs over those of the pregnancy/fetus, or at least an expenditure of effort. For example, if one were to acknowledge that dietary practices affect the health of the baby, this would likely necessitate ensuring health dietary practices during the pregnancy. Women who are less attached to their fetus may have more difficulty following through on these pregnancy-related health practices, and thus may place more emphasis on the role of powerful others and chance on determining the outcome of their pregnancy.

Contrary to expectations, the FHLC subscales did not exhibit significant relationships with prenatal testing. This result was surprising in that the FHLC-I, in particular, has been linked to many pregnancy-related health behaviours. The lack of findings with regard to FHLC-I is likely due to the poor reliability the measure exhibited in the present study (see section 5.1.3 for a psychometric analysis). As well, the FHLC scale has not been used extensively, and likely requires additional work to ensure adequate psychometric performance. Further research is needed to determine whether a relationship exists between fetal health locus of control and prenatal testing status.

In the present study, participants who had a previous miscarriage were found to have increased prenatal emotional attachment, which suggests that women who have had a miscarriage are more heavily invested in subsequent pregnancies. This finding was of particular interest because past literature would suggest that these women should either have lower levels of prenatal attachment (Armstrong & Hutti, 1998), or that attachment should not differ between the groups (Armstrong, 2002). Theory would suggest that women who have had miscarriages would delay bonding, much like those waiting for prenatal testing results. Of the 120 women interviewed by Katz-Rothman (1993), only 13 did not feel fetal movement until after the eighteenth week of pregnancy. Eleven of these women were awaiting amniocentesis results. One of the other women had experienced a miscarriage in the fifth month of pregnancy during the previous year, and the other had spent eight and a half years trying to get pregnant and stated, "I don't think I'll really believe this is for real until I'm holding the baby" (p. 105). These results support the contention that women who have had previous miscarriages experience 'tentative pregnancies,' and thus delay maternal-fetal bonding. Therefore, the present study's finding of increased attachment among women who have had previous miscarriages conflicts with previous research and theory. Thus, this finding requires replication to determine whether women who have had previous miscarriages are in fact more invested, and thus more bonded in their subsequent pregnancies, or whether the results were spurious.

5.1 Limitations

5.1.1 Sample homogeneity and other demographic characteristics. Ninety-three percent of the sample were Caucasian and 96% of the sample were married or common law. Therefore, further research is required to determine whether the effects observed in

the present study would hold across marital status groups (e.g., single, divorced/ separated, and widowed) and ethnic/cultural groups.

Demographic information was not collected regarding the socio-economic status of participants. Thus, future research is required to determine whether the observed results vary according to income, education, and employment status of participants.

5.1.2 Lack of method of recruitment tracking. Due to the shift in methodology, some women self-selected for participation and some were recruited by their physicians. As both methodologies allowed for women to submit their completed survey by mail, the researchers were unable to track which women were recruited by each respective methodology. A comparison of participants recruited via each respective methodology on key variables, such as age, gestational age, PAI scores, and scores on each respective FHLC subscale would have provided evidence regarding the similarity (or lack of) of the two groups.

5.1.3 Fetal Health Locus of Control – internal reliability. An aim of the present research was to provide additional evidence of the reliability of the FHLC subscales and the PAI. The PAI achieved a high level of reliability, and construct validity was evidenced by the significant positive correlation between PAI scores and gestational age. However, the FHLC subscales did not fare as well. The FHLC-C and FHLC-P achieved reasonable levels of reliability, while the reliability FHLC-I was low.

Due to the low Cronbach's alpha value found for the FHLC-I, an item analysis was performed. All items on this subscale had sufficient positive corrected item-total correlations, ranging from .30 to .57. All inter-item correlations were positive. As well, deletion of any of the items would result in a decrease in the reliability of the total scale. Thus, the low reliability seems to be unrelated to individual item properties. The low

reliability found within the present study is either an abnormally low result found by chance, or an actual psychometric shortcoming of the FHLC-I subscale. The latter is quite possible, as there is a scarcity of studies that have examined this scale's psychometric properties using pregnant women. Even the article that reports on the development and validation of the scale (Labs & Wurtele, 1986) fails to report reliabilities for the pregnant women who completed the measure; rather the article reports reliabilities for the initial sample of introductory psychology class whose responses were used for item selection.

5.2 Future Research

5.2.1 Measurement of prenatal emotional attachment. Sluckin, Herbert, and Sluckin (1983) criticize the measurement of mother-to-infant attachment on the grounds that it has not been measured using multiple criteria. The same criticism may easily be levelled against the maternal-fetal attachment literature. Muller (1993) examined the concurrent validity of the PAI against the MFAS (another scale measuring maternal-fetal attachment; Cranley, 1981). Further exploration is needed in terms of the association between closed-ended scales and qualitative measurement of prenatal attachment. Laxton-Kane and Slade (2002) suggest that qualitative studies may assist in further development of prenatal attachment as a construct, which would in turn lead to improvements in the quantitative measurement tools. Another potential means of prenatal attachment measurement triangulation is third party reports. For example, Siddiqui et al. (1999) correlated midwives' ratings of overall prenatal attachment with PAI scores. There may also be some utility in considering observational measures of prenatal attachment.

5.2.2 Longitudinal research. Although research has established that prenatal attachment is positively correlated with gestational age (Armstrong, 2002; Condon, 1985; Damato, 2000; Lindgren, 2001), few have tracked attachment longitudinally over the course of pregnancy (Bloom, 1995; Caccia et al., 1991; Grace, 1989). Grace's article focused solely on the nature of the increase in maternal-fetal attachment across gestation. Bloom also focused on the nature of the increase, but in addition, incorporated a post-natal attachment measurement into her study. Caccia et al. evaluated bonding at pre- and post-PDT result. Doan and Zimerman (2003) suggest that the development and interaction of a variety of constructs that may be pertinent to prenatal and postnatal attachment should be studied from prior to pregnancy through to the postnatal period. They suggest that cognitive skills to formulate abstractions, emotional skills, and attachment to one's own parents should be investigated prior to pregnancy; that life style changes, fantasies about the fetus/child, internal representations of the fetus, and prenatal attachment be investigated during pregnancy; and that the development of attachment promoting behaviours and postnatal attachment, congruence between the fantasy and reality baby, maternal sensitivity to the infant's cues, and maternal attunement to the infant's affect regulation be examined after birth. Longitudinal studies that both examine an increased number of variables and gather data at an increased number of intervals are needed in order to expand knowledge regarding the factors that predict and impact prenatal emotional attachment at the various stages of pregnancy. Currently, it is not known whether the impact of prenatal testing on prenatal attachment has lasting effects post-result, post-partum, and in subsequent pregnancies.

5.2.3 Relationship between pre- and post-natal attachment. It is surprising how few studies have compared prenatal and postnatal maternal-fetus/infant attachment.

Even more surprising is the failure of these studies to use traditional measures of postnatal attachment. In order for the concept of prenatal attachment to become more widely accepted, it is necessary for studies to establish the construct's association with postnatal attachment, and to do so using measures used by mainstream attachment researchers.

Muller (1994), for example, created her own measure of postnatal maternal-infant attachment (the Maternal Attachment Inventory, MAI) in order to "avoid the confusion that is sometimes generated when scores from a questionnaire are correlated with scores from observing behaviors" (Muller, 1996, p. 163). The MAI is focused on the feelings, thoughts, and actions of mothers toward their infants, and thus easily lends itself to comparison with the PAI, which examines women's feelings toward their fetuses. During construction of the MAI, Muller correlated the new measure with "How I Feel About the Baby Now" (Leifer, 1977), the first subscale of the Maternal Separation Anxiety Scale (Hock, McBride, & Gnezda, 1989, as cited in Muller, 1994), and the Maternal Attitudes and Maternal Adjustment Scale (Kumar, Robson, & Smith, 1984, as cited in Muller, 1994). These measures are, no doubt, important to establish the nomothetic network of constructs linked to attachment, but none of these questionnaires measure attachment and therefore cannot provide evidence of concurrent validity or of the relationship between Muller's conceptualization of attachment and traditional attachment measures.

In terms of mainstream attachment measures, it is likely that PAI scores would be more strongly related to measures of adult attachment than to measures of child-mother attachment. Measures of child-mother attachment (e.g., Attachment Behavior Q-set, Ainsworth's Strange Situation) focus on the attachment of infants to their mother

figures (Ainsworth, Blehar, Waters, & Wall, 1978), whereas measures of adult attachment classify adults in terms of attachment styles (e.g., Adult Attachment Interview [AAI], Main & Goldwyn, 1994, as cited in Crowell & Treboux, 1995). Research has shown that maternal attachment styles are associated with their behaviour toward their infants. For example, more securely attached mothers have been found to be more responsive, sensitive, and understanding to their infants at one and two years of age (Grossman, Fremmer-Bombik, Rudolph, & Grossman, 1988, as cited in Crowell & Treboux, 1995). The PAI focuses on a mother's attachment toward her fetus, and thus it is likely that her own attachment style would impact on her relationship with her fetus. A preliminary study suggests that this is in fact the case. Mikulincer and Florian (1999) found that securely attached women were strongly attached to their fetus from early in the pregnancy, and tended to report using support seeking as a coping strategy. Women with an avoidant attachment style showed weak attachment to the fetus in the first and last trimester and stronger prenatal attachment in the second trimester, and reported using distancing as a coping strategy. Women with an anxious-ambivalent attachment style showed a gradual increase in attachment throughout the pregnancy, and reported using an emotion-focused coping style.

Maternal attachment styles have also been associated with child attachment status. For example, Ward & Carlson (1995) found that prenatal AAI classifications of adolescent mothers predicted maternal sensitivity assessed at three and nine months and child attachment status at 15 months. In a meta-analysis of adult attachment measures, Crowell and Treboux (1995) report that most studies find approximately an 80% correspondence between parental AAI classifications and infant Strange Situation classifications. Assuming maternal attachment styles are associated with maternal

prenatal attachment, maternal prenatal attachment may predict child attachment status. Further research is necessary to determine whether such relationships exist, and if so, the nature of the associations between the variables. In order for prenatal attachment to gain wider acceptance outside of the nursing literature, it is imperative that better-established measures of postnatal attachment be utilized to assess the relationship between pre- and post-natal attachment.

5.2.4 Prenatal attachment, fetal health locus of control, and health practices. It is possible that the relationship between prenatal attachment and internal FHLC is merely due to their mutual correlation with health care practices. Future research is needed to determine whether the relationship between FHLC and prenatal emotional attachment exists independent of health practices during pregnancy. Measures of health practices during pregnancy that could be used as a control include the Health Practices Questionnaire (HPQ; Lindgren, 2001) and the Self-Care Inventory (Pardine, n.d., as cited in Walker et al., 1999). The former questionnaire is designed to measure both positive and negative pregnancy-related health practices such as healthy eating, getting adequate sleep, and smoking and alcohol use. The latter questionnaire measures a broader range of both positive and negative health behaviours, but is not specifically intended for pregnant populations.

Examining the predictive value of prenatal attachment and FHLC on health practices during pregnancy would be of inherent value for health practitioners, and for those designing interventions for promote healthy behaviours among pregnant women. As noted by Stewart and Cecutti (1993), a woman who believes that her behaviour has little effect on the health of her fetus, and rather that it is controlled by chance, will have low motivation to change maladaptive health-related behaviours. Therefore, initiatives

designed to encourage health practices during pregnancy would require a different focus for women high in FHLC-C than for those who simply require information regarding what behaviours are and are not recommended. Additionally, messages delivered by a health practitioner may have more resonance and credibility with women who feel "powerful others" control the health of their fetus.

5.3 Implications

The experience of pregnancy is not only one of the most major events in a woman's life, but also an important period for building the foundation for the future mother-child relationship. It has become increasingly evident in recent years that medical technology has an indelible impact on the psychosocial experience of pregnancy, and the findings of the present study suggest that serum screening may be even more detrimental to bonding than amniocentesis. As serum screening is poised to become a standard component of prenatal care, it would be prudent to proceed with caution. Additionally, the present study's finding that internal locus of control is positively related to maternal-fetal attachment underscores the importance of encouraging women to appreciate their own critical role in determining the fetus' health. Prenatal testing protocols should integrate these findings so that physicians and women are aware of the potential influences on prenatal emotional attachment, and the psychosocial consequences of prenatal screening.

6. REFERENCES

Ainsworth, M. D. S., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation.* Toronto: John Wiley & Sons.

Anderson, J. C. (1995). Amniocentesis, chorionic villus sampling and fetal blood sampling. In R. J. Trent (Ed.), *Handbook of prenatal diagnosis* (pp. 58-79). New York: Cambridge University Press.

Armstrong, D. S. (2002). Emotional distress and prenatal attachment in pregnancy after perinatal loss. *Journal of Nursing Scholarship, 34,* 339-345.

Armstrong, D., & Hutti, M. (1998). Pregnancy after perinatal loss: The relationship between anxiety and prenatal attachment. *Journal of Obstetric, Gynecologic, and Neonatal Nursing, 27,* 183-189.

Bassett, K. (2000). *Triple-marker screening in British Columbia: Current practice, future options* (BCOHTA 00:14T). Vancouver: British Columbia Office of Health Technology Assessment, The University of British Columbia (Final report made to: The Minister's Advisory Council on Women's Health).

Berryman, J. C., & Windridge, K. C. (1996). Pregnancy after 35 and attachment to the fetus. *Journal of Infant and Reproductive Psychology, 14,* 133-143.

Bielawska-Batorowicz, E. (1993). The effect of previous obstetric history on women's scores on the Fetal Health Locus of Control Scale (FHLC). *Journal of Reproductive and Infant Technology, 11,* 103-106.

Bloom, K. C. (1995). The development of attachment behaviours in pregnant adolescents. *Nursing Research, 44,* 284-289.

Bowlby, J. (1969). *Attachment and loss*. New York: Basic Books.

Bowlby, J. (1988). *A secure base: Parent-child attachment and healthy development.* New York: Basic Books.

Bretherton, I. (1985). Attachment theory: Retrospect and prospect. *Monographs of the Society for Research in Child Development, 50,* 3-35.

Browner, C.H., Preloran, H. M., & Cox, S. J. (1999). Ethnicity, bioethics, and prenatal diagnosis: The amniocentesis decisions of Mexican-origin women and their partners. *American Journal of Public Health, 89,* 1658-1666.

Caccia, N., Johnson, J. M., Robinson, G. E., & Barna, T. (1991). Impact of prenatal testing on maternal-fetal bonding: Chorionic villus sampling versus amniocentesis. *American Journal of Obstetrics and Gynecology, 1122-1125.*

Canadian College of Medical Geneticists & the Society of Obstetricians and Gynaecologists of Canada. (2001a, July). *Canadian guidelines for prenatal diagnosis: Techniques of prenatal diagnosis.* Retrieved from http://www.sogc.org/sogcnet/sogc_docs/common/guide/pdfs/ ps105b.pdf.

Canadian College of Medical Geneticists & the Society of Obstetricians and Gynaecologists of Canada. (2001b, June). *Canadian guidelines for prenatal diagnosis: Genetic indications for prenatal diagnosis.* Retrieved from http://www.sogc.org/sogcnet/sogc_docs/common/ guide/pdfs/ps105.pdf.

Carson, G. (2003). *Using Serum Screening in Saskatchewan.* Presentation at the Pediatrics, Gynecology, & Obstetrics 2003 Conference. Retrieved July 16, 2004 from http://www.usask.ca/cme/articles/serumscreening.shtml.

Carter-Jessop, L. (1981). Promoting maternal attachment through prenatal intervention. *MCN: American Journal of Maternal/Child Nursing, 6,* 107-112.

Christensen, A. J., Moran, P. J., & Wiebe, J. S. (1999). Assessment of irrational health beliefs: Relation to health practices and medical regimen adherence. *Health Psychology, 18,* 169-176.

Conde-Agudelo, A., & Kafury-Goeta, A. C. (1998). Triple marker test as screening for Down syndrome: A meta analysis. *Obstetrical and Gynecological Survey, 53,* 369-376.

Condon, J. T. (1985). The parental foetal relationship: A comparison of male and female expectant parents. *Journal of Psychosomatic Obstetrics and Gynaecology, 4,* 271-284.

Condon, J. T. (1986). The spectrum of fetal abuse in pregnant women. *The Journal of Nervous and Mental Disease, 174,* 509-516.

Condon, J. T. (1988). A comparison of smoking and drinking behaviours in pregnant women: Who abstains and why. *The Medical Journal of Australia, 148,* 381-384.

Condon, J.T. (1993). The assessment of antenatal emotional attachment: Development of a questionnaire instrument. *British Journal of Medical Psychology, 66,* 167-183.

Condon, J. T., & Dunn, D. J. (1988). Nature and determinants of parent-to-infant attachment in the early postnatal period. *Journal of the American Academy of Child and Adolescent Psychiatry, 27,* 293-299.

Condon, J. T., & Esuvaranathan, V. (1990). The influence of parity on the experience of pregnancy: A comparison of first- and second-time expectant couples. *British Journal of Medical Psychology, 63,* 369-377.

Cranley, M. S. (1981). Development of a tool for the measurement of maternal attachment during pregnancy. *Nursing Research, 30,* 281-284.

Crowell, J.A. & Treboux, D. (1995) A review of adult attachment measures: Implications for theory and research. *Social Development, 4,* 294-327.

Damato, E. G. (2000). Maternal attachment in twin pregnancies. *Journal of Obstetric, Gynecologic, and Neonatal Nursing, 29,* 598-605.

Davis, M. S. & Akridge, K. M. (1987). The effect of promoting intrauterine attachment in primiparas on postdelivery attachment. *Journal of Obstetric, Gynecologic, and Neonatal Nursing, 16,* 430-437.

Delisle, M. F., & Wilson, R. D. (1999). First trimester prenatal diagnosis: Amniocentesis. *Seminars in Perinatology, 23,* 414-423.

Denes, M. (1976). *In necessity and sorrow: Life and death in an abortion hospital.* New York: Basic Books.

Dick, P. T. (1996). Periodic health examination, 1996 update: 1. Prenatal screening for and diagnosis of Down syndrome. *Canadian Medical Association Journal, 154,* 465-479.

Dixson, B., Richards, T. L., Reinsch, S., Edrich, V. B., Matson, M. R., Jones, O. W. (1981). Midtrimester amniocentesis. Subjective maternal responses. *The Journal of Reproductive Medicine, 26,* 10-16.

Doan, H. M., & Zimerman, A. (2003). Conceptualizing prenatal attachment: Toward a multidimensional view. *Journal of Prenatal and Perinatal Psychology and Health, 18,* 109-129.

Franco, K., Belinson, J., Casey, G., Plummer, S., Tamburrino, M., & Tung, E. (2000). Adjustment to perceived ovarian cancer risk. *Psycho-Oncology, 9,* 411-417.

French, B. N., Kurczynsi, T. W., Weaver, M. T., & Pituch, M. J. (1992). Evaluation of the Health Belief Model and decision making regarding amniocentesis in women of advanced maternal age. *Health Education Quarterly, 19,* 177-186.

Fuller, J. R. (1990). Early patterns of maternal attachment. *Health Care for Women International, 11,* 433-446.

Furr, L. A., Seger, R. E. (1998). Psychosocial predictors of interest in prenatal genetic screening. *Psychological Reports, 82,* 235-244.

Gau, M. L., & Lee, T. Y. (2003). Construct validity of the Prenatal Attachment Inventory: A confirmatory factor analysis approach. *Journal of Nursing Research, 11,* 177-187.

Gosden, C., Nicolaides, K., & Whitting, V. (1994). *Is my baby alright?: A guide for expectant parents.* New York: Oxford Press.

Grace, J. T. (1989). Development of maternal-fetal attachment during pregnancy. *Nursing Research, 38,* 228-232.

Halliday, J. L., Lumley, J., & Watson, L. (1995). Comparison of women who do and do not have amniocentesis or chorionic villus sampling. *The Lancet, 345,* 704-709.

Haslam, C., Lawrence, W., & Haefeli, K. (2003). Intention to breastfeed and other important health-related behaviour and beliefs during pregnancy. *Family Practice, 20,* 528-530.

Health Canada. (2002). *Congenital anomalies in Canada: A perinatal health report.* Ottawa, ON: Author.

Heckerling, P., Verp, M., & Hadro, T. (1994). Preferences of pregnant women for amniocentesis or chorionic villus sampling for prenatal testing: Comparison of patients' choices and those of a decision-analytic model. *Journal of Clinical Epidemiology, 47,* 1215-1288.

Heidrich, S. M., & Cranley, M. S. (1989). Effect of fetal movement, ultrasound scans, and amniocentesis on maternal-fetal attachment. *Nursing Research, 38,* 81-84.

Heyman, B., & Henriksen, M. (2001). *Risk, age and pregnancy: A case study of prenatal and genetic testing.* New York: Palgrave.

Howell, D. C. (1997). *Statistical Methods for Psychology* (4th ed.). Toronto: Duxbury Press.

Jenkins, T. M., & Wapner, R. J. (1999). First trimester prenatal diagnosis: Chorionic villus sampling. *Seminars in Perinatology, 23,* 403-413.

Jones, O. W. (2000). Chorionic villus sampling and amniocentesis. In R. V. Lee, K. Rosene-Montella, L. A. Babour, P. R. Garner & E. Keely (Eds.), *Medical care of the pregnant patient* (pp. 97-103). Philadelphia: American College of Physicians.

Katz-Rothman, B. (1993). *The tentative pregnancy: How amniocentesis changes the experience of motherhood* (2nd ed.). New York: W. W. Norton & Company.

Kemp, V. H., & Page, C. K. (1987). Maternal prenatal attachment in normal and high-risk pregnancies. *Journal of Obstetric, Gynecologic, and Neonatal Nursing, 16,* 178-184.

Labs, S.M., & Wurtele, S. K. (1986). Fetal Health Locus of Control Scale: Development and validation. *Journal of Consulting and Clinical Psychology, 54,* 814-819.

Lawson, K. L. (2001). Contemplating selective reproduction: The subjective appraisal of parenting a child with a disability. *Journal of Infant and Reproductive Psychology, 19,* 73-82.

Lawson, K. L., & Stolz, C. L. (2002, June). *For the greater good: The role of public health goals in attitudes toward self versus other use of prenatal diagnostic testing.* Poster session presented at the 63rd Annual Convention of the Canadian Psychological Association, Vancouver, BC.

Laxton-Kane, M., & Slade, P. (2002). The role of maternal prenatal attachment in a woman's experience of pregnancy and implications for the process of care. *Journal of Reproductive and Infant Psychology, 20,* 253-266.

Leifer, M. (1977). Psychological changes accompanying pregnancy and motherhood. *Genetic Psychology Monographs, 95,* 55-96.

Levenson, H. (1974). Activism and powerful others: Distinctions within the concept of internal-external control. *Journal of Personality Assessment, 38,* 377-383.

Lindgren, K. (2001). Relationships among maternal-fetal attachment, prenatal depression, and health practices in pregnancy. *Research in Nursing and Health, 24,* 203-217.

Marteau, T. M., Plenicar, M., & Kidd, J. (1993). Obstetricians presenting amniocentesis to pregnant women: Practice observed. *Journal of Reproductive and Infant Psychology, 11,* 3-10.

McDonald-Miszczak, L., Maki, S. A., & Gould, O. N. (2000). Self-reported medication adherence and health status in late adulthood: The role of beliefs. *Experimental Aging Research, 26,* 189-207.

Mercer, R. T., Ferketich, S., May, K., DeJoseph, J., & Sollid, D. (1988). Further exploration of maternal and paternal fetal attachment. *Research in Nursing and Health, 11,* 83-95.

Mikhail, M. S., Freda, M. C., Merkatz, R. B., Polizzotto, R., Mazloom, E., & Merkatz, I. R. (1991). The effect of fetal movement counting on maternal attachment to fetus. *American Journal of Obstetrics and Gynecology, 165,* 988-991.

Mikulincer, M., & Florian, V. (1999). Maternal-fetal bonding, coping strategies, and mental health during pregnancy – The contribution of attachment style. *Journal of Social and Clinical Psychology, 18,* 255-276.

Moore, K. L., & Persaud, T. V. N. (1998). *The developing human: Clinically oriented embryology.* Toronto, ON: W. B. Saunders Company.

Moyer, A., Brown, B., Gates, E., Daniels, M., Brown, H. D., & Kuppermann, M. (1999). Decisions about prenatal testing for chromosomal disorders: Perceptions of a diverse group of pregnant women. *Journal of Women's Health and Gender-Based Medicine, 8,* 521-531.

Muller, M.E. (1993). Development of the Prenatal Attachment Inventory. *Western Journal of Nursing Research, 15,* 199-215.

Muller, M. E. (1994). A questionnaire to measure mother to infant attachment. *Journal of Nursing Measurement, 2,* 129-141.

Muller, M. E. (1996). Prenatal and postnatal attachment: A modest correlation. *Journal of Obstetric, Gynecologic, and Neonatal Nursing, 25,* 61-166.

Rapp, R. (1999). *Testing women, testing the fetus: The social impact of amniocentesis in America.* New York: Routledge.

Reading, A. E., Cox, D. N., Sledmere, C. M., & Campbell, S. (1984). Psychological changes over the course of pregnancy: A study of attitudes toward the fetus/neonate. *Health Psychology, 3,* 211-221.

Reisch, L. M., & Tinsley, B. J. (1994). Impoverished women's health locus of control and utilization of prenatal services. *Journal of Reproductive and Infant Psychology, 12,* 223-232.

Rice, P. L., & Naksook, C. (1999). Pregnancy and technology: Thai women's perceptions and experience of prenatal testing. *Health Care for Women International, 20,* 259-278.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied, 80,* 1-28.

Royal Commission on New Reproductive Technologies. (1993). *Proceed with care: Final report of the Royal Commission on New Reproductive Technologies* (Vol. 2). Ottawa: Royal Commission on New Reproductive Technologies.

Rubin, R. (1975). Maternal tasks in pregnancy. *Maternal-Child Nursing Journal, 4,* 143-153.

Rubin, R. (1977). Binding-in in the postpartum period. *Maternal-Child Nursing Journal, 6,* 67-75.

Schwartz-Cowan, R. (1994). Women's roles in the history of amniocentesis and chorionic villi sampling. In K. Rothenberg & E. Thomson (Eds.), *Women and Prenatal Testing: Facing the Challenges of Genetic Technology,* pp. 35-48. Columbus: Ohio State University Press.

Siddiqui, A., & Haeggloef, B. (2000). Does maternal prenatal attachment predict postnatal mother-infant interaction? *Early Human Development, 59,* 13-25.

Siddiqui, A., Haeggloef, B., & Eisemann, M. (1999). An exploration of prenatal attachment in Swedish expectant women. *Journal of Reproductive and Infant Psychology, 17,* 369-380.

Siddiqui, A., Haeggloef, B., & Eisemann, M. (2000). Own memories of upbringing as a determinant of prenatal attachment in expectant women. *Journal of Reproductive and Infant Psychology, 18,* 67-74.

Simoni, J. M., & Ng, M. T. (2002). Abuse, health locus of control, and perceived health among HIV-positive women. *Health Psychology, 21,* 89-93.

Silvestre, D., & Fresco, N. (1980). Reactions to prenatal diagnosis: An analysis of 87 interviews. *American Journal of Orthopsychiatry, 50,* 610-617.

Singer, E. (1991). Public attitudes toward genetic testing. *Population Research and Policy Review, 10,* 235-255.

Sluckin, W., Herbert, M., & Sluckin, A. (1983). *Maternal bonding.* Oxford: Basil Blackwell.

Smith, A. (1995). Cytogenetics and prenatal diagnosis. In R. J. Trent (Ed.), *Handbook of prenatal diagnosis* (pp. 80-109). New York: Cambridge University Press.

Speckhard, A. (1997). Traumatic death in pregnancy: The significance of meaning and attachment. In C. R. Figley, B. E. Bride, & N. Mazza (Eds.), *Death and trauma: The traumatology of grieving* (pp. 67-100). Washington: Taylor & Francis.

Spencer, J. W., & Cox, D. N. (1988). A comparison of chorionic villus sampling and amniocentesis: acceptability of procedure and maternal attachment to pregnancy. *Obstetrics and Gynecology, 72,* 714-718.

Spirito, A., Ruggiero, L., McGarvey, S. T., Coustan, D. R., & Low, K. G. (1990). Maternal and fetal health locus of control during pregnancy: A comparison of women with diabetes and nondiabetic women. *Journal of Reproductive and Infant Psychology, 8,* 195-206.

Stainton, M.C. (1994). "The epistomology of expectant parenthood": Commentary. *Western Journal of Nursing Research, 16,* 616-618.

Steptoe, A., & Wardle, J. (2001). Health behaviour, risk awareness and emotional well-being in students from Eastern Europe and Western Europe. *Social Science and Medicine, 53,* 1621-1630.

Stewart, D. E., & Cecutti, A. (1993). Physical abuse in pregnancy. *Canadian Medical Association Journal, 149,* 1257-1263.

Stewart, D. E., & Streiner, D. L. (1994). Alcohol drinking in pregnancy. *General Hospital Psychiatry, 16,* 406-412.

Stewart, D. E., & Streiner, D. L. (1995). Cigarette smoking in pregnancy. *Canadian Journal of Psychiatry, 40,* 603-607.

Suthers, G., & Haan, E. (1995). Maternal serum screening and prenatal diagnosis for birth defects. In R. J. Trent (Ed.), *Handbook of prenatal diagnosis* (pp. 4-27). New York: Cambridge University Press.

Tinsley, B. J., Trupin, S. R., Owens, L., & Boyum, L. A. (1993). The significance of women's pregnancy-related locus of control beliefs for adherence to recommended prenatal health regimes and pregnancy outcomes. *Journal of Reproductive and Infant Psychology, 11,* 97-102.

University of Manitoba Department of Biochemistry and Medical Genetics. (2001a). *Information for patients.* Retrieved from http://www.umanitoba.ca/faculties/medicine/units/biochem/programs/other/tripletest.html.

University of Manitoba Department of Biochemistry and Medical Genetics. (2001b). Q*uestions about prenatal diagnosis.* Retrieved from http://www.umanitoba.ca/academic/faculties/medicine/biochem/programs/other/prenatquest.html.

University of Manitoba Department of Biochemistry and Medical Genetics. (2001c). *Triple marker screening in Manitoba: Information for physicians and support staff*. Retrieved from http://www.umanitoba.ca/academic/faculties/medicine/biochem/programs/other/doctorsinfo.htm.

Walker, L. O., Cooney, A. T., & Riggs, M. W. (1999). Psychosocial and demographic factors related to health behaviors in the 1st trimester. *Journal of Obstetric, Gynecologic, and Neonatal Nursing,28,* 606-614.

Wallston, K. A., Maides, S. A., & Wallston, B. S. (1976). Health-related information seeking as a function of health-related locus of control and health value. *Journal of Research in Personality, 10,* 215-222.

Wallston, K. A., Wallston, B. S., & DeVellis, R. (1978). Development of the Multidimensional Health Locus of Control (MHLC) Scales. *Health Education Monographs, 6,* 160-170.

Wallston, B. S., Wallston, K. A., Kaplan, G. D., & Maides, S. A. (1976). Development and validation of the Health Locus of Control (HLC) Scale. *Journal of Consulting and Clinical Psychology, 44,* 580-585.

Ward, M. J., & Carlson, E. A. (1995). Associations among adult attachment representations, maternal sensitivity, and infant-mother attachment in a sample of adolescent mothers. *Child Development, 66,* 69-79.

Weaver, R., H., & Cranley, M. S. (1983). An exploration of paternal-fetal attachment behavior. *Nursing Research, 32,* 68-72.

Wertz, D. C., Janes, S. R., Rosenfield, J. M., & Erbe, R. W. (1992). Attitudes toward the prenatal diagnosis of cystic fibrosis: Factors in decision making among affected families. *American Journal of Human Genetics, 50,* 1077-1085.

Appendix A

Prenatal Attachment Inventory (Muller, 1993)

The following sentences describe thoughts, feelings, and situations women may experience during pregnancy. We are interested in your experiences <u>during the past month</u>. Please circle the number under the word that applies to you when thinking about your baby.

	Almost Always	Often	Sometimes	Almost Never
1. I wonder what the baby looks like now.	1	2	3	4
2. I imagine calling the baby by name.	1	2	3	4
3. I enjoy feeling the baby move.	1	2	3	4
4. I think that my baby already has a personality.	1	2	3	4
5. I let other people put their hands on my tummy to feel the baby move.	1	2	3	4
6. I know things I do make a difference to the baby.	1	2	3	4
7. I plan the things I will do with my baby.	1	2	3	4
8. I tell others what the baby does inside me.	1	2	3	4
9. I imagine what part of the baby I'm touching.	1	2	3	4
10. I know when the baby is asleep.	1	2	3	4
11. I can make my baby move.	1	2	3	4
12. I buy / make things for the baby.	1	2	3	4
13. I feel love for the baby.	1	2	3	4
14. I try to imagine what the baby is doing in there.	1	2	3	4

	Almost Always	Often	Sometimes	Almost Never
15. I like to sit with my arms around my tummy.	1	2	3	4
16. I dream about the baby.	1	2	3	4
17. I know why the baby is moving.	1	2	3	4
18. I stroke the baby through my tummy.	1	2	3	4
19. I share secrets with the baby.	1	2	3	4
20. I know the baby hears me.	1	2	3	4
21. I get very excited when I think about the baby.	1	2	3	4

Appendix B

Fetal Health Locus of Control Scale (Labs & Wurtele, 1986)

The following items are designed to determine the way in which you view various health issues concerning pregnancy.

Each item is a belief statement with which you can either agree or disagree. Beside each statement is a scale that ranges from strongly disagree (0) to strongly agree (9). For each item, we would like you to circle the number that best represents the extent to which you agree or disagree with the statement. <u>The more strongly you agree with a statement, the higher will be the number you circle. The more strongly you disagree with a statement, the lower will be the number you circle.</u> Please be sure that you answer every item and that you circle <u>only one</u> number per item.

	Strongly Disagree			Slightly Disagree			Slightly Agree			Strongly Agree
1. By attending prenatal classes taught by competent health professionals, I can greatly increase the odds of having a healthy, normal baby.	0	1	2	3	4	5	6	7	8	9
2. Even if I take excellent care of myself when I am pregnant, fate will determine whether my child will be normal or abnormal.	0	1	2	3	4	5	6	7	8	9
3. My baby will be born healthy only if I do everything my doctor tells me to do during pregnancy.	0	1	2	3	4	5	6	7	8	9
4. If my baby is born unhealthy or abnormal, nature intended it to be that way.	0	1	2	3	4	5	6	7	8	9
5. The care I receive from health professionals is what is responsible for the health of my unborn baby.	0	1	2	3	4	5	6	7	8	9

	Strongly Disagree			Slightly Disagree			Slightly Agree			Strongly Agree
6. My unborn child's health can be seriously affected by my dietary intake during pregnancy.	0	1	2	3	4	5	6	7	8	9
7. Health professionals are responsible for the health of my unborn child.	0	1	2	3	4	5	6	7	8	9
8. If I get sick during pregnancy, consulting my doctor is the best thing I can do to protect the health of my unborn child.	0	1	2	3	4	5	6	7	8	9
9. No matter what I do when I am pregnant, the laws of nature will determine whether or not my child will be normal.	0	1	2	3	4	5	6	7	8	9
10. Doctors and nurses are the only ones who are competent to give me advice concerning my behaviour during pregnancy.	0	1	2	3	4	5	6	7	8	9
11. God will determine the health of my child.	0	1	2	3	4	5	6	7	8	9
12. Learning how to care for myself before I become pregnant helps my child to be born healthy.	0	1	2	3	4	5	6	7	8	9
13. My baby's health is in the hands of health professionals.	0	1	2	3	4	5	6	7	8	9
14. Fate determines the health of my unborn child.	0	1	2	3	4	5	6	7	8	9

	Strongly Disagree			Slightly Disagree			Slightly Agree			Strongly Agree
15. What I do right up to the time that my baby is born can affect my baby's health.	0	1	2	3	4	5	6	7	8	9
16. Having a miscarriage means to me that my baby was not destined to live.	0	1	2	3	4	5	6	7	8	9
17. Before becoming pregnant, I would learn what specific things I should do and not do during the pregnancy in order to have a healthy, normal baby.	0	1	2	3	4	5	6	7	8	9
18. Only qualified health professionals can tell me what I should and should not do when I am pregnant.	0	1	2	3	4	5	6	7	8	9

Appendix C

Demographic Items (subset of items that were used in a larger study)

The next few questions ask you about your experiences and/or attitudes toward prenatal testing. Prenatal tests, such as amniocentesis and serum screening, can provide information about the health of a baby before it is born. (Note: Ultrasound is not included as a prenatal test for the purpose of this survey, as it is a routine part of prenatal care for most women).

Please read the following questions carefully and then write down your responses in the space provided.

1. Have you had prenatal testing in this pregnancy?

❑ Yes ➔ If yes, what kind of testing? _____
❑ No

→ **If no, do you wish to have serum screening in this pregnancy?** (circle the correct response)

1	2	3	4	5
Definitely not	Probably not	Don't know	Probably	Definitely

→ **If no, do you wish to have amniocentesis in this pregnancy?** (circle the correct response)

1	2	3	4	5
Definitely not	Probably not	Don't know	Probably	Definitely

This section asks a few questions about you. These questions help us to determine if we have surveyed a wide variety of people. This ensures that our results will reflect the many differing views that different people may hold on these issues. Please take a few minutes to answer these questions.

1. **What is your age?** _____(years)

2. **How many weeks pregnant are you?** _____ (weeks)

3. **Are you**: (check the correct response)

❑ Single
❑ Married
❑ Divorced/Separated
❑ Widowed

4. Are you:

- ❑ Caucasian
- ❑ First Nations
- ❑ Metis
- ❑ Asian
- ❑ African-Canadian
- ❑ Other _____

5. How important is it to you to parent children during your life?

1	2	3	4	5
Not At All Important		Neither Important nor Unimportant		Extremely Important

6. How many times have you been pregnant before this pregnancy? _____ (times)

7. Have you experienced a miscarriage in a previous pregnancy?

- ❑ No
- ❑ Yes ➔ if yes, how many times have you miscarried? _____ (times)

8. Have you had prenatal testing in a previous pregnancy?

- ❑ No
- ❑ Yes

→ if yes, what kind of testing? _____

→ if yes, were you told after prenatal testing that your fetus had a disease or disability?

- ❑ No
- ❑ Yes ➔ if yes, what was the outcome of the pregnancy?
  - ❑ I continued with the pregnancy and gave birth to a child with a disability.
  - ❑ I continued with the pregnancy and gave birth to a healthy child.
  - ❑ I continued with the pregnancy and miscarried.
  - ❑ I aborted the pregnancy.

9. Have you ever had an abortion?

- ❑ No
- ❑ Yes ➔ if yes, how many abortions have you had? _____

10. Do you have children?

- ❑ No
- ❑ Yes ➔ if yes, how many children do you have? _____

11. Please rate the strength of your religious beliefs. (circle the correct response)

1	2	3	4	5
Not at all Strong		Moderately Strong		Extremely Strong

12. How much do you agree with the following statements (please circle the number that best corresponds with your views):

	Strongly Disagree	Somewhat Disagree	No Opinion	Somewhat Agree	Strongly Agree
1. A woman should never have an abortion.	1	2	3	4	5
2. It is a woman's choice whether or not to continue a pregnancy.	1	2	3	4	5
3. Abortion is wrong in any circumstance.	1	2	3	4	5
4. Abortion is a personal decision.	1	2	3	4	5

Appendix D

Introductory Letter

Dear Prenatal Care Client,

Medical discoveries are being made faster than we can keep up with them. The growing knowledge means that many new medical procedures are available to us, and this is especially true for prenatal care. Prenatal testing is one option that is now available to pregnant women. Prenatal tests, such as amniocentesis, maternal serum screening and ultrasound provide information about the health of a baby before it is born. Some expectant mothers use these tests to reassure themselves that their baby is healthy. If a diagnosis of disability is made, women can then prepare for parenting a disabled child or can choose to end the pregnancy.

The number of pregnant women being referred for prenatal testing is growing daily and with the development of new tests it is likely that testing could soon become a routine part of medical care for all pregnant women. When things advance this quickly, the opinions of those most affected are often not taken into account before new medical procedures or policies are put in place. In fact, very little is known about how pregnant women feel about prenatal testing, and that is why we are doing this survey.

This survey examines how pregnant women feel about their pregnancy and about the option of prenatal testing. We believe that your opinions should be considered before new procedures are put in place. This survey will provide information that could be used to guide policy decisions in a manner that reflects the needs of pregnant women. To help us collect this information, we ask that you complete the enclosed questionnaire booklet and return it to us by either mailing it in the envelope provided or by placing it in the drop-box located in your physician's office. If you are interested in participating, please read the inside page of the questionnaire booklet for more information about this survey. ***We ask that, if you do participate, that you complete this questionnaire only once in your pregnancy***.

Your opinions are very important to this research project. As a way of thanking you for taking the time to participate in this survey, please keep the pen attached to this survey as a token of our appreciation for your cooperation. Also, please keep this letter for your records.

Thank you for your help with this project.

Sincerely,

Karen Lawson, Ph.D.

Prenatal Testing Study – Information Sheet

ABOUT THIS SURVEY

The purpose of this survey is to examine how pregnant women feel about prenatal testing. The questionnaire takes about 20-30 minutes to complete. When you have completed the questionnaire, please return it to the researchers either by mailing it in the envelope provided or by placing it in the drop-box in your physician's office.

ANONYMITY

Your answers to the survey are meant to be anonymous. Please **DO NOT** write your name on your questionnaire. Only the researchers will have access to the completed questionnaires and no one will be able to identify you on the basis of your answers. Even the researcher will not know which questionnaire belongs to which person. Finally, all the responses to the questions will be combined or averaged so that the answers of any one individual cannot be determined. Return of the completed questionnaire implies permission to include your answers in the combined dataset, which will be analyzed and presented in journal articles and conference presentations.

YOUR PARTICIPATION IN THIS RESEARCH

Please be as honest as possible when answering the survey. Some of the questions deal with issues that are controversial, and we are interested in the finding out the many different opinions that people may have. We ask you to carefully consider each question and tell us about how you really think. There are no right or wrong answers to any of these questions and no one will ever know how you responded to the questions. So you can feel comfortable in giving your true opinions.

This questionnaire does ask you about very personal opinions and experiences, but because these are issues that touch all pregnant women, there are no real risks to filling out the questionnaire. However you are free to decide not to complete the questionnaire at any time. You can also decide not to answer any specific question that makes you uncomfortable. In the event that you find any of these questions upsetting and wish to speak to a counselor about these issues, please contact Dr. Lawson (contact information below) for a referral.

This project was approved by the University of Saskatchewan Behavioural Ethics Research Board on April 9/02. If you have any questions or concerns about this survey or your rights as a participant in this survey or your participation in this study, please contact Dr. Karen Lawson, Department of Psychology, University of Saskatchewan at (306) 966-2524 [e-mail: Karen.Lawson@usask.ca] or Office of Research Services, (306) 966-4053. If you would like a summary of the study results, please contact Dr. Karen Lawson at the above phone number or e-mail address.

THANK YOU FOR YOUR HELP WITH THIS PROJECT

Appendix E

Introduction from the Questionnaire Booklet

Women's Experience of Pregnancy and Prenatal Care

The purpose of this survey is to examine how pregnant women feel about their pregnancy and about using prenatal testing as a part of their prenatal care. The questionnaire takes about 20-30 minutes to complete. When you have completed the questionnaire, please return it to the researcher, either by mailing it in the envelope provided or by placing it in the drop-box in your physician's office.

Your answers to the survey are meant to be anonymous. Please **DO NOT** write your name on your questionnaire. Only the researcher will have access to the completed questionnaires, and no one will be able to identify you on the basis of your answers. Even the researcher will not know which questionnaire belongs to which person. Finally, all the responses to the questions will be combined or averaged so that the answers of any one individual cannot be determined. Return of the completed questionnaire implies permission to include your answers in the combined dataset, which will be analyzed and presented in journal articles and conference presentations.

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