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Is Maternal Personality and Coping Style Related to Breech Presentation? Evaluating the Chinese Medicine and Ayurvedic Models of Risk Factors for Breech Presentation

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Abstract: We investigated maternal personality characteristics and coping style as potential risk factors for breech presentation in this case-control study. Mothers of cephalic presentation babies (n=72) and mothers of breech presentation babies (n=42) participated in a socio-demographic survey, the State Trait Personality Inventory (STPI), and an in-depth interview. In-depth interview results suggested mothers of breech presentation were more likely to be idealistic, analytical, overextended, and fearful; also less likely to be flexible. Similar differences are identified in the Chinese medicine and Ayurvedic medicine models of risk factors for breech presentation.

Keywords: breech presentation; prenatal; personality; pregnancy; attachment; Chinese medicine; Ayurvedic medicine.

Introduction

Breech presentation is the most common human birth malpresentation and occurs in 3-4% of all pregnancies (Cunningham et al., 2005), however its etiology is largely unknown as are the factors initiating turning to cephalic presentation (Sekulic, 2000). In this paper we present results from a case-control mixed methodology study that evaluated the Ayurvedic and Chinese Medicine models of risk factors for breech presentation. Breech presentation is considered to be an adverse pregnancy outcome and is associated with increased infant mortality and morbidity (Albrechtsen, Rasmussen, Dalaker, & Irgens, 1998; Luterkort, Polberger, Weldner, Persson, & Bjerre, 1986; Roberts, Algert, Peat, & Henderson-Smart,

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1999). Identified risk factors for breech presentation include nulliparity, advancing maternal age, a history of a previous breech baby, female fetus, low birth weight, and preterm birth (Amoa, Sapuri, & Klufio, 2001; Jonas & Roder, 1993; Nordtveit, Melve, Albrechtsen, & Skajaerven, 2008: Rayl, Gibson, & Kickok, 1996; Roberts et al., 1999; Vendittelli et al., 2008,). Unexpectedly, higher maternal education, middle or upper socio-economic status, and white non-Hispanic ethnicity are also risk factors for breech presentation (Amoa et al., 2001; Hofmeyr, Sadan, Myer, Galal, & Simko, 1986; Peterson, 2010; Rayl et al., 1996; Roberts et al., 1999). Together these risk factors only account for 5% of the total variance.

In the West breech presentation is considered to be a mechanical problem related to fetal abnormalities such as size or hip function, or to maternal pelvic or uterine inadequacies (Faber-Nijholt, Huisjes, Touwen, & Fidler, 1983; Sival, Prechtl, Sonder, & Touwen, 1993). However, the highest quality study to evaluate neurologic and orthopedic differences between breech (n=90) and cephalic (n=180) presentation babies found minor and transient mechanical differences; only one of which was statistically significant (Bartlett, Okun, Byrne, Watt, & Piper, 2000; Bartlett, Piper, Okun, Byrne, & Watt, 1997). A well-designed study to evaluate the influence of the maternal pelvis and the uterine characteristics on breech presentation enrolled a breech cohort at 33 weeks gestation (n=228) and found only 15% of variance was accounted for by these factors when considered together with infant malformations (Luterkort, Persson, & Weldner, 1984).

In contrast to the allopathic Western model, the East conceptualizes breech presentation as an imbalance of qi or prana – vital life energy – that is manifest in predictable personality characteristics and behavioral styles (Banks, 1998; Maciocia, 1998; McGilvray, 1994). This imbalance is reflected in maternal attitude and behavior and impacts the maternal-fetal relationship, making turning to cephalic presentation difficult since turning is considered to be a task jointly accomplished by mother and fetus. In the Eastern model turning to cephalic presentation is considered to be an important neurobehavioral developmental step in which the baby individuates (Banks, 1998; McGilvray, 1994). Although the Eastern model of risk factors for breech presentation has not been investigated extensively, the Chinese medicine means of turning breech babies is up to 75% effective (Cardini & Weixin, 1998; Coyle, Smith, & Peat, 2008); effectiveness that rivals that of external cephalic version (Hutton & Hofmeyr, 2009).

The purpose of our study was to compare mothers of breech

presentation babies and mothers of cephalic presentation for the maternal characteristics identified in the Eastern model as risk factors for breech presentation. The null hypothesis of our study was that there was no difference in personality, behavioral, and coping styles between mothers of breech babies and mothers of cephalic presentation babies. Maternal thoughts, feelings, and experiences have been demonstrated to be associated with a variety of pregnancy outcomes (Field et al., 2010; Jundt et al., 2009), but no identified previous study has explored these maternal characteristics as potential risk factors for breech presentation. It is important to have a more complete understanding of risk factors for breech presentation since vaginal breech delivery is thought of as a risky delivery (Hannah et al., 2000) and cesarean sections pose a financial cost to families and the health care system (Grant, 2010) in addition to increasing the possibility of the baby experiencing long term physiologic sequelae such as allergies and asthma (Pistiner, Gold, Abdulkerim, Hoffman, & Celedon, 2008) and the mother having more difficulty bonding with her baby (Lobel, Cannella, DeVincent, & Schneider, 2008).

Methods

This mixed-methods retrospective population-based case-control study compared personality characteristics and life experiences of mothers who had a breech presentation baby during the previous year with those of mothers who had a cephalic presentation baby the previous year. Data were collected in 2005-2006 using a socio-demographic survey, the State Trait Personality Inventory (STPI), and in-depth interviews. This study was approved by the University of South Florida Institutional Review Board. Informed consent was given by all participants. Each participant was given a unique identifier that was used instead of her name.

Sample

A purposive sample was recruited by internet and by print announcements in Florida health care facilities, educational centers, and shopping locales. The inclusion criteria of the study were that the mother was at least 18 years old and had a singleton birth in the past 12 months. The exclusion criteria were that the mother was pregnant at the time of contact or had lived outside of the US during pregnancy or gave birth outside of the US. Recollection of pregnancy and birth is most accurate closer to the event (Souza et al., 2010; Troude et al.,

2008), which is why limiting the sample to mothers who had given birth in the previous year should yield reliable results. One study found that seven years after birth women's memories of pregnancy were 89% accurate when compared to hospital records (Githens, Glass, Sloan, & Entman, 1993). Thus, only women who were not currently pregnant and had a baby in the previous 12 months were eligible for our study.

Measures

Validated measures. The State Trait Personality Inventory (STPI) is a validated psychometric instrument consisting of 80 items that evaluate anger, anxiety, depression, and curiosity. Alpha coefficients reported range from .80 to .93 (Spielberger, Ritterband, Reheiser, & Brunner, 2003, p.216, 223). Only the trait component of the inventory was analyzed (Spielberger & Reheiser, 2003; Spielberger, Ritterband, Sydeman, Reheiser, & Unger, 1995). The Hollingshead Index of Social Position was used to measure the stressors of occupation and education (Miller & Salkind, 2002). Occupation and educational level achieved were quantified to provide a social position score that indicates upper class (11-17), upper-middle class (18-31), middle class (32-47), lower-middle class (48-63), and lower class (64-77).

Unique measures. The socio-demographic survey was designed for this study with variables based upon a review of the literature. Survey sections included socio-demographics, health and obstetric history, and a series of questions about stress and emotions. The instrument had been piloted (Czaja & Blair, 2005; Schensul, Schensul, & LeCompte, 1999). In-depth interviews elicited information about formative life experiences, pregnancy, birth, and the postpartum period. In-depth, open-ended interviews are useful for exploring new areas of inquiry without the constraints of predetermined response options or response length; a random sample is not necessary nor expected (Schensul et al., 1999, p.122; Yow, 1994, p.1-25).

Data Collection

Data collection typically took place at the participant's home. Non-local mothers completed the survey online and their interviews were conducted by telephone. Generally, the survey was completed at the first visit (15-30 minutes) and the interview was completed at a second visit (1.5-2 hours). Interview data was collected to the point of

saturation when no new types of responses were elicited (Schensul et al., 1999). Mothers were given $20 for completion of the survey and $20 for completion of the interview (Cook & Nunkoosing, 2008).

Analysis

STPI and socio-demographic survey data were input into an Access database then exported into SAS 9.1.3 (SAS Institute, Cary, NC) to be cleaned (LeCompte & Schensul, 1999:130) and arranged in meaningful categories. In-depth interviews were transcribed then uploaded into MaxQDA (VERBI Software, Marburg Germany) for analysis.
Descriptive statistics were calculated for the survey and STPI data. Cases and controls were compared with t-tests for the STPI data and for the Hollingshead Index of Social Position. Multiple case narrative analysis was used to analyze the interviews since groups were compared rather than individuals (Shkedi, 2005). Multiple case narrative analysis consists of four phases:

1) Identifying emergent themes,
2) Mapping themes to demonstrate relationships between them,
3) Building descriptive narratives for each theme, and
4) Situating the findings within the literature (Onwuegbuzie & Teddlie, 2003; Shin, Kim & Chung, 2009; Shkedi, 2005).

Mothers of cephalic presentation babies who had personality characteristics similar to mothers of breech presentation babies were compared for dissimilarities (i.e. negative cases) (LeCompte & Schensul, 1999). These exceptions to emergent patterns helped to further elaborate the pattern and to reveal limitations of the early model (LeCompte & Schensul, 1999). Special cases of mothers whose babies were breech late in pregnancy and then turned to cephalic presentation with maternal assistance were also studied and compared with mothers of breech babies and mothers whose babies were never in the breech position. Interview impressions were discussed with colleagues who helped to elucidate categories and associations.

Results

Sample

The entire sample consisted of 114 mothers (n=72 cephalic presentation, n= 42 breech presentation). In-depth interviews were

completed by 75 of the 114 mothers (n=52 cephalic presentation, n= 23 breech presentation). The mothers who only completed the survey did not have time to complete the interview, or did not tell the investigator why they did not complete the interview. The sample was not representative of the general population as nearly 40% of all mothers of cephalic presentation babies had a family member who had been born breech as did over 50% of all mothers of breech presentation babies, which are much higher percentages than found in the general population.

Survey & Validated Measures

Mothers of breech presentation babies reflected similar socio-demographic trends to those reported in the literature (Albrechtsen et al., 1998; Peterson, 2010). Mothers of breech babies were more likely to be married, older, better educated, and more financially stable than were mothers of cephalic presentation babies.

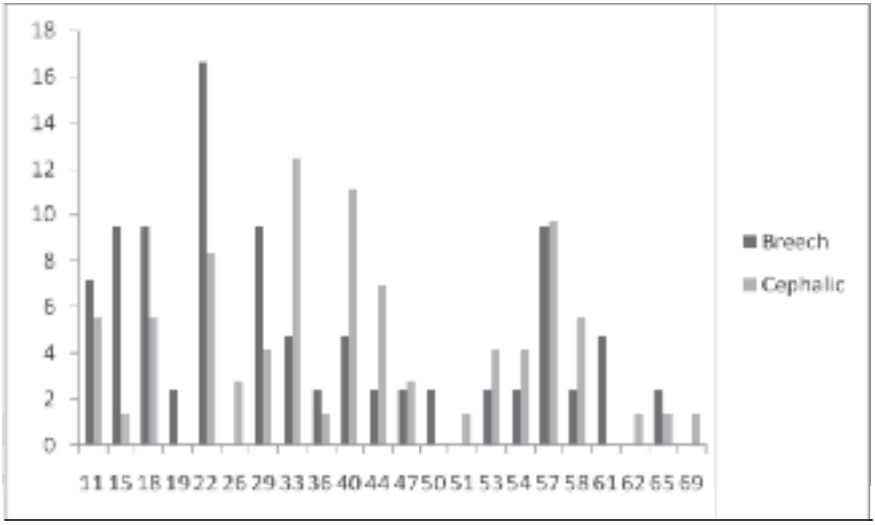

Figure 1. Hollingshead Social Index comparing the social prestige scores of mothers of breech presentation babies with mothers of cephalic presentation babies. Mothers of breech babies had higher social prestige (M=33, SD=17) than mothers of cephalic presentation babies (M=41, SD=16) t(112=-2.47, p=0.015), two-tailed t-test.

Table 1. Maternal and Paternal Socio-Demographic Characteristics: Breech and Cephalic Presentation Babies Compared by Number and Percentage or Mean and Standard Deviation

Variable	Cephalic (n=72) n (%) or M (SD)	Breech (n=42) n (%) or M (SD)
Maternal Age		
18-19 years	3 (4.17%)	1 (2.38%)
20-24 years	21 (29.17%)	7 (16.67%)
25-29 years	20 (27.78%)	11(26.19%)
30-34 years	20(27.78%)	16 (38.10%)
35+ years	8 (11.11%)	7 (16.67%)
Paternal Age		
<20	7 (9.72%)	10 (23.81%)
20-29	24 (33.33%)	2 (4.76%)
30-39	36 (50.0%)	25 (59.52%)
40-49	5 (6.94%)	5 (11.90%)
Maternal Ethnicity		
White non-Hispanic	46 (63.89%)	38 (90.48%)
Black non-Hispanic	12 (16.67%)	1 (2.38%)
Hispanic	10 (13.89%)	3 (7.14%)
Other	6 (8.34%)	0
Paternal Ethnicity[1]		
White non-Hispanic	41 (57.75%)	35 (83.33%)
Black non-Hispanic	12 (16.90%)	2 (4.76%)
Hispanic	14 (19.72%)	5 (11.90%)
Other	4 (5.64%)	0
Maternal Education		
< 12 years	2 (2.78%)	0
High School	11 (15.28%)	3 (7.14%)
Trade School	2 (2.78%)	2 (4.76%)
Some college	28 (38.89%)	9 (21.43%)
College (4 years)	18 (25.0%)	20 (47.62%)
Master's	8 (11.11%)	5 (11.90%)
Doctoral	3 (4.17%)	3 (7.14%)
Paternal Education		
< 12 years	0	0
High School	20 (27.78%)	8 (19.05%)
Trade School	4 (5.56%)	1 (2.38%)
Some college	23 (31.94%)	13 (30.95%)
College (4 years)	15 (20.83%)	13 (30.95%)
Master's	8 (11.11%)	5 (11.90%)
Doctoral	2 (2.78%)	2 (4.76%)
Mean income last year	$60,901 (SD=46,229)	$81,547 (SD=66,348)
Received WIC or Medicaid in last pregnancy[2]	30 (44.78%)	8 (19.05%)
Married	46 (63.89%)	39 (92.86%)

[1]cephalic paternal ethnicity n=7
[2]cephalic received WIC or Medicaid n=6

Maternal obstetric history trends also paralleled those reported in the literature (Albrechtsen et al., 1998; Peterson, 2010; Roberts et al., 1999). Mothers of breech babies were more likely than mothers of cephalic presentation babies to be pregnant with their first baby, have a planned pregnancy, begin prenatal care in the first trimester, and take their vitamins as prescribed.

Table 2. Maternal Reproductive History Characteristics: Breech and Cephalic Presentation Babies Compared by Number and Percentage

Variable	Cephalic (n=72) n (%)	Breech (n=42) n (%)
Trying to get pregnant	37 (51.39%)	28 (66.67%)
Took prenatal vitamins like supposed to	51 (76.12%)*	35 (83.33%)
Prenatal Care Began		
1st tri	65 (90.28%)	40 (95.42%)
2nd tri	7 (9.72%)	2 (4.76%)
First baby born to mother	28 (38.89)	29 (69.05)

There was no significant difference between mothers of breech presentation babies and mothers of cephalic presentation babies for the following traits: anxiety $t(112) = 0.523$, $p=0.60$, curiosity $t(112) = 0.887$, $p=0.38$, anger $t(112) = 0.494$, $p=0.62$, and depression $t(112) = -0.384$, $p = 0.70$. While mothers of breech babies followed trends observed in the literature for socio-demographic and obstetric characteristics, their babies did not for most variables except birth weight (Albrechtsen et al., 1998; Peterson, 2010). Female babies were over-represented in the sample, and more cephalic presentation babies were born preterm than were breech babies.

Table 3. Newborn Characteristics: Breech and Cephalic Presentation Babies Compared by Number and Percentage or Mean and Standard Deviation

Variable	Cephalic (n=72) n (%) or M (SD)	Breech (n=42) n (%) or M (SD)
Female Fetus	42 (58.33%)	24 (57.14%)
Gestational age		
< 37 weeks	8 (11.11%)	4 (9.52%)
37-40 weeks	49 (68.06%)	33 (78.57%)
41-42 weeks	15 (20.83%)	5 (11.90%)
Birthweight		
500-1499 grams	0	1 (2.38%)
1500-2499 grams	6 (8.33%)	5 (11.90%)
2500-4000 grams	53 (73.61%)	34 (80.95%)
4000.001-5500 grams	13 (18.06%)	2 (4.76%)
Length (inches)	20 (SD=1.57)	19.78 (SD=1.27)

In-Depth Interviews

Five themes emerged from the interviews that differentiated mothers of breech presentation babies from mothers of cephalic presentation babies. Mothers of breech presentation babies were more likely to be idealistic (100% breech, 15% cephalic), analytical (83% breech, 40% cephalic), overextended (78% breech, 27% cephalic), and fearful (65% breech, 17% cephalic) than were mothers of cephalic presentation babies. Furthermore, mothers of breech babies did not have the same coping skills as mothers of cephalic presentation babies and were less likely to be flexible (35% breech, 85% cephalic) in the face of adversity than were mothers of cephalic presentation babies.

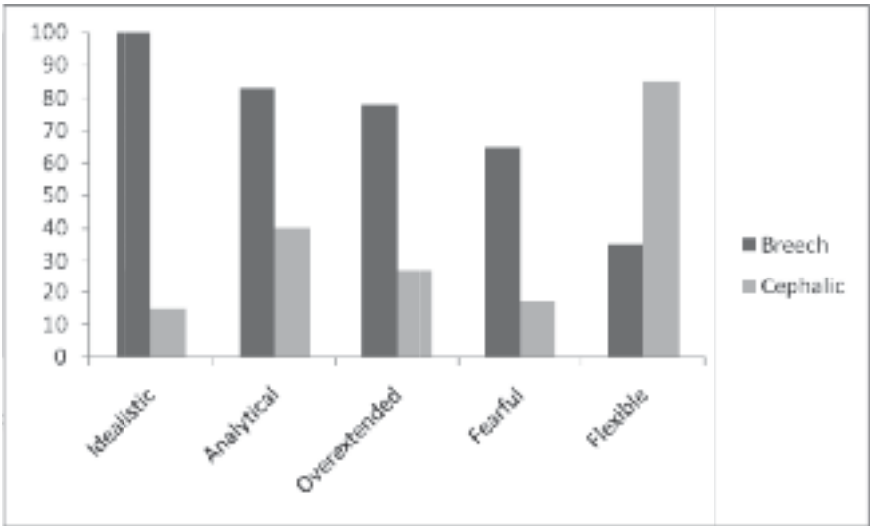

Figure 2. Comparison of Personality Characteristics and Coping Style of Mothers of Breech and Cephalic Presentation Babies

The following sections report on three interview comparisons 1) mothers of breech babies with mothers of cephalic presentation babies, 2) negative cases of mothers of cephalic presentation babies who were important exceptions to the overarching pattern, and 3) special cases of mothers of cephalic presentation babies whose babies had been breech late in pregnancy. Pseudonyms are used in all examples.

Mothers Of Breech Babies Compared With Mothers Of Cephalic Presentation

Idealism

Idealism included qualities such as being an overachiever, being high strung, or having high expectations. These women tended to push themselves to perform at peak levels and expected others to do the same. All mothers of breech presentation shared the characteristic of being idealistic.

> I was one of those kids who pushed myself a lot academically. I think that came from my own personality. I don't remember my parents pushing me. (Stephanie)

Idealism provided mothers of breech presentation with an impetus for sustained action and persistence. It also created the possibility of great disappointment and disillusionment when goals were not met or when outcomes were not as expected. While idealism promoted excellence, it might also have promoted emotional distance between the mother and her child because of the dedication which it demands.

Analytical

An analytically focused mother reflected qualities such as enjoyment of complex decision-making and intensive cognitive activity. Because of their innate braininess many of these women pursued higher education, but even for those who did not, the mind was still their playground.

> I'm a thinker. I'm very analytical. I analyze everybody. Everything they say everything they do. I'm very analytical. I guess in that aspect my sister [who also had a breech baby] and I are the same. (Mercedes)

For these mothers, analysis was a social buffer, a coping mechanism, and a recreational activity. The tendency to cope through analysis fostered a disconnect between emotions and lived experience, where emotions were either not fully experienced or not fully trusted. The mind was trustworthy and therefore the preferred mechanism of interfacing with experience.

Overextended

Most mothers of breech presentation babies had very little downtime for relaxation and recreation. Often they were self-defined as "very busy."

> I was at a new job and I needed to appear eager, hard-working, focused. And they didn't know I was pregnant. I would be sitting in meetings and poking my leg with a pen or pinching myself to keep my eyes open. That was very stressful. (Kelly)

These women represented a preference to be busy, even when given the choice to relax. Part of this was expressed as a concern that if she stopped, worries and fears would overcome her. Concerns were held at bay through constant motion. Women who were overextended were also very responsible by nature and wanted to excel at work to facilitate the smooth functioning of the organization. This larger vision and driving force, however, compartmentalized their life. Because life was compartmentalized, the baby often was not allowed into all aspects of everyday living.

Fearful

These mothers experienced fear about possible pregnancy loss, other adverse pregnancy outcomes, childbirth pain, or parenting. Many of these mothers had a history of a previous adverse pregnancy outcome, a history of abuse, and some simply appeared to have a fearful nature.

> I used to have a lot of nightmares about the baby suffocating and the cord being wrapped around her neck when she was born. I think I had it because of the miscarriage. You could have a totally normal pregnancy then lose your baby. That freaks me out. (Mindy)

Fears of the mothers of breech babies were partially promoted by the medical community since mothers of breech presentation tend to be older and require more fetal tests.

> The CVS [chorionic villa sampling] results came back that we were having a girl and she was chromosomally fine. But we had to wait through two weeks of intense stress to get the test done

> and get the results: waiting to get the test done, waiting to get the results, waiting to hope that I wouldn't miscarriage…It was just really stressful. (Isa)

Maternal fears seemed to prevent the mothers from fully bonding with the baby during pregnancy, and thus although all mothers in the study expressed love for their babies, fearful mothers were not as able to give into that love and allow themselves to be close to the baby during pregnancy.

Flexibility

The characteristic of flexibility was a hallmark of mothers of cephalic presentation babies (85%) and noteworthy due to its omission in many of the narratives of mothers of breech babies (65%). Women who were able to be flexible were well adapted to respond to challenges in life. They were able to reappraise their goals and intentions and alter them without undue drama when circumstances changed.

Cassie was a flexible mother who had a cephalic presentation baby. She got pregnant with her fourth child six weeks after her third child was born. When she announced she was pregnant again her mother was upset. Cassie responded

> Yeah, it was too soon. But I'm 27 years old. It's not like I live in her house or I'm 17, no job, three kids, no school, no nothing…Granted, I know she was scared, but what are you going to do?…It's a baby. How can you really be mad unless the situation is really, really bad?

Cassie discovered her baby had hydrocephaly when she was in her fifth month of pregnancy. Like other mothers of cephalic presentation babies she parented her baby in utero. When asked about her fears during pregnancy she responded

> I'd talk with my husband about my fears and concerns. I tried to keep it light with the baby. I didn't want to depress him in my belly. I don't want to make him sad.

Mothers of cephalic presentation babies who were able to respond to stressors with flexibility did not blunt their emotions when disappointing things happened. They allowed themselves to

experience the emotions, and took the necessary steps to care for themselves and for their babies as they worked out an alternative plan. They were able to maintain an optimistic, yet reality-based, perspective in the face of adversity. Flexibility allowed mothers to maintain their role of parent protecting their baby while not living in a fantasy.

Negative Cases

(Mothers of cephalic presentation babies who had personality characteristics similar to mothers of breech presentation babies)

Negative cephalic presentation cases are similar to the mothers of breech presentation babies as far as having high expectations, holding positions of responsibility, and being very cerebral. Upon closer inspection mothers with these characteristics who had cephalic presentation babies were differentiated from the mothers who had breech presentation babies by their ability to be flexible and experience deep-seated change during pregnancy – what we term "the transformation of pregnancy."

> I had a lot more stress before I was pregnant. Being pregnant, having that goal, knowing I was going to have a baby, brought so much joy. It really grounded me enough to realize that these little stupid things would stress me and keep me awake at night are not that important. (Linda)

Negative cases represent the transformative power of pregnancy. If a mother is able to take on the role of parent during the pregnancy and enter into the enjoyment of engaging with her child, her life is reprioritized. The baby is fully integrated into her life and although she might continue experiencing the same stressors as before, they are reevaluated and do not impact her life to the same degree as they did prior to the pregnancy.

Special Cases

Four mothers in the study had babies who were in breech presentation late in pregnancy but the babies turned prior to birth. These mothers were treated as special cephalic presentation cases. The cases were studied to determine if they differed in some seminal way from other mothers of breech presentation babies. Like mothers of breech presentation babies, these mothers shared the characteristics

of being idealistic, analytical, and very active. However, they were able to slow down enough to identify their baby's needs and make changes to meet those needs.

> He was very happy in there. I was very happy to have him and it was wonderful [to be pregnant]. But, I kind of felt like he was getting a little too comfortable and it was time and he just needed a little maternal kick to jumpstart him [in the form of a small flashlight I used to induce the baby to turn]. (Megan)

These mothers whose babies turned late in pregnancy slowed down their lives, stopped practices that they perceived the baby disliked, and made responsible decisions for the baby that the baby might not have chosen for himself. As a result, mothers were able to integrate the baby into daily life and consistently parent.

In all 75 interviews, mothers of cephalic presentation babies and mothers of breech babies expressed love for their babies and discussed challenges in life and during pregnancy. The difference in the two groups was not exposure to stressors. The difference was interpretation of the stressor and response to the stressor. Mothers of cephalic presentation babies either already possessed characteristics which allowed them to respond flexibly to life stressors in a reality-based way, or were transformed by pregnancy and eventually let go of a stressful external focus and allowed themselves to consistently interact with their baby.

Discussion

This small case-control mixed methodology study is the first identified study to compare the personality and coping mechanisms of mothers of breech presentation babies with mothers of cephalic presentation babies. We found mothers of breech presentation babies differed from mothers of cephalic presentation babies in five important ways that mirrored the risk factors for breech presentation identified in Chinese medicine and Ayurvedic medicine. Mothers of breech presentation babies were more likely to be idealistic, analytical, overextended, and fearful. Additionally, they tended to lack the coping mechanism of flexibility, which was found more often in mothers of cephalic presentation babies. Stories and characteristics represented by negative cases and special cases suggested coping strategies might be the more important difference between the two groups of mothers rather than personality characteristics or actual life stress

experienced. The marked differences in personality and coping styles of the two groups of mothers in this study parallel personality and coping styles of women who have Bladder meridian imbalances in Chinese medicine or vatta dominance in Ayurvedic medicine, which are risk factors for breech presentation in Eastern medicine (Banks, 1998; Beresford-Cooke, 2003; Konstantinovsky, 2010; Maciocia, 1998; McGilvray, 1994).

This concurrence supports the possibility that breech presentation,

Table 4. Comparison of Characteristics of Mothers of Breech Babies, Individuals with Bladder Meridian Imbalance, and a Vatta Dominant Dosha

Characteristic	Mother of Breech Baby	Bladder Meridian Imbalance	Vatta Dosha Dominance
Overextended	X	X	X
Fearful	X	X	X
Idealistic/High Strung	X		X
Analytical/Quick Minded	X		X
Less Flexible	X		X

in part, could reflect a response to aspects of the intra-uterine relationship.

Other factors found in our study and in the literature further support the possibility that certain maternal personality or behavioral characteristics influence the intra-uterine environment. One of the unexpected associations of breech presentation was that white non-Hispanic women and women who are not socioeconomically disadvantaged are at risk, as is the female fetus. These populations are generally protected from adverse pregnancy outcomes (Boivin, Sanders, & Schmidt, 2006). While advanced education and high status occupations usually promote health and fertility in men, this does not seem to be the case for women (Weeden, Abrams, Gree, & Sabini, 2006). Unlike men, women who work intensively and who create their own wealth experience unique stressors that make it difficult for them physiologically and in relationships (Hammig & Bauer, 2009; Hopcroft, 2006; Nordenmark, 2004; Steptoe et al., 2003; Stewart, Ahmad, Cheung, Bergman, & Dell, 2000).

Typically more males are conceived and born than females. We know that male fetuses and infants are generally more at risk of adverse events (Boklage, 2005), however in breech presentation we see the female fetus is more at risk. We similarly find a reverse sex ratio with excess females in populations that have been exposed to stressors such as traumatic political or terrorist events (Bruckner, Catalano, & Ahern, 2010) , natural events such as earthquakes (Fukuda, Fukuda, Shimizu, & Moller, 1998), and even moderate stressors (Obel, Henriksen, Secher, Eskenazi, & Hedegaard, 2007). While the mechanical Western model of risk factors for breech presentation attributes the excess female fetus risk to their size, another possibility is that breech presentation is another example of the reverse sex ratio due to intra-uterine stressors. Finally, depression, anger, anxiety, and curiosity as measured by the STPI were not trait characteristics more frequently associated with mothers of breech babies than mothers of cephalic presentation babies in our study. This absence of significance is also aligned with the Eastern model of risk factors for breech presentation, which does not indicate the involvement of these particular characteristics.

In Chinese medicine breech presentation is potentiated by a Bladder meridian that is out of balance. The Bladder meridian influences uterine function due to their proximity (Beresford-Cooke, 2003). Persons who experience long-term Bladder imbalance tend to be over worked and chronically stressed. This is in part due to the Bladder meridian influencing our need to appear perfect and to hide

our imperfections from others and even from ourselves at times. Fear is the emotion associated with the Bladder meridian. However, it is often not an overt fear, but rather a restlessness that prevents one from being still and finding peace (Beresford-Cooke, 2003). Chinese medicine treats breech presentation by applying moxibustion to Bladder 67 (BL-67) acupuncture point. This treatment involves placing a smoldering cone of *artemesia vulgaria* close to the lateral aspect of the fifth digit toenail (Coyle et al., 2008). It is thought that this treatment allows the Bladder meridian to draw energy from its "mother" meridian the Large Intestine and thus tonify the Bladder meridian. Bladder 67 is used to treat extreme Yin which is found in individuals who are at the point of exhaustion, and feeling like they have nothing left to give (Gumenick, 2005).

Ayurvedic medicine is an ancient Indian system of medicine based in the Vedic scriptures (Zysk, 1993). In Ayurvedic medicine there are three types of doshas, or physical constitutions: vatta, pitta, and kapha. Women whose dominant dosha is vatta have a weak flow of apana vayu, the "wind" of prana necessary for blowing the baby to cephalic position and also related to cleansing out negative emotions and reproduction in general (McGilvray, 1994). These women tend to be quick-minded, high-strung, emotionally sensitive, and very active (Konstantinovsky, 2010; Null & Seaman, 1999). Vatta dominant women have more difficulties dealing with emotional and physical challenges than do the other doshas (Buhrman, 1996). Of interest, women in general tend to move toward vatta dominance as they age (Krishan, 2003; Lonsdorf & Mishra, 2002). Ayurveda treatments for vatta dominance include diet, yoga, meditation, massage, and homeopathy (Lad, 1984; Morrison, 1995).

Emerging evidence points to the importance of further investigating the possibility that turning to cephalic presentation is a neurobehavioral developmental stage. For instance, the natural history of turning to cephalic presentation appears to support this neurodevelopmental proposition since breech babies continue turning to cephalic presentation as long as they are in-utero (Witkop, Zhang, Sun, & Troendle, 2008). Additionally, thyroid hormones act as a developmental switch and as a maturational factor in vertebrates (Amiel-Tison et al., 2004). Maternal thyroxine (T4) crosses the placenta and is essential for central nervous system and organ development particularly in the first half of pregnancy when the fetal thyroid is too immature to influence growth and development (Blackburn, 2009). Similar to breech presentation, mothers with subclinical hypothyroidism have a higher probability of having a

preterm baby (p = 0.011) (Casey et al., 2005). Several studies have now found that mothers of breech presentation babies are more likely to display subclinical thyroid disorders than are mothers of cephalic presentation babies (Kuppens et al., 2010). Mothers (n=58 breech, n=1000 cephalic) with subclinical hypothyroidism (thyroid stimulating hormone >2.4mIU/L) in the third trimester are at 84% increased risk of having a breech baby (Kooistra et al., 2010). A smaller study of 204 (n=12 breech) women found that subclinical hypothyroidism (free T4 levels <10th percentile) at 12 weeks predicted breech presentation at term (OR = 4.7, 95% CI 1.1—10) (Pop et al., 2004). Thyroid hormones are essential for neurobehavioral development and can be altered by environmental exposures including psychosocial stress (Friedman, Wang, Jalowiec, McHugo, & McDonagh-Coyle, 2005; Plaza et al., 2010).

The idea that the intra-uterine environment influences development is not new. Barker's fetal origins hypothesis asserts that the intra-uterine environment influences physiologic plasticity for the fetus and its effects extend into adulthood (Barker, Osmond, Golding, Kuh, & Wadsworth, 1989). In this model the baby is constantly assessing the intra-uterine environment in an attempt to predict the extra-uterine environment (Gluckman, Hanson, & Beedle, 2007).

The gravid uterus not only houses a physiologic environment, but an interdependent relationship environment as well (Cozolino, 2006). Human infants are altricial and have been termed "extero-uterine fetuses" to reflect their relative immaturity at birth (Hrdy, 1999). Because our species has a large head, necessary to house our brain, accompanied by a small pelvis, necessary for bipedalism, we give birth to young who have prolonged dependency upon a primary caregiver for survival (Rosenberg & Trevathan, 2002). For our species more so than for others it is important for the baby to carefully assess the intra-uterine environment to be able to accurately predict the extra-uterine environment so she can behave in ways to promote the type of caregiving required for survival (Bergman, Sarkar, O'Connor, Modi, & Glover, 2007; Bowlby, 1969; Davis & Sandman, 2010; Grant, Austin, Reilly, Leader, & Ali, 2009; Huizink, Robles de Medina, Mulder, Visser, & Buitelaar, 2003; Leung et al., 2010). Thus, just as the fetus attempts to predict the extra-uterine physical environment, so too might the fetus attempt to predict the extra-uterine relationship environment based upon intra-uterine relationship exposures (Gau & Lee, 2003).

Prenatal attachment studies in the past ten years consistently point to the similarity between the type of relationship that mother and fetus begin to develop in the womb with the type of relationship they continue to form after birth (Bryan, 2000; Damato, 2004; Siddiqui

& Hagglof, 2000; Wilson et al., 2000). And new research suggests intra-uterine maternal-fetal attachment can be enhanced by optimizing maternal qi in pregnancy (Ji & Han, 2010). Of interest, the maternal characteristics that are risk factors for breech presentation are strikingly similar to the personality and behavioral characteristics manifest by mothers who experience ambivalent attachment with their babies (Siegel, 1999). This too suggests that the fetus is attempting to behaviorally predict the extra-uterine environment.

If turning to cephalic presentation is a neurodevelopmental stage, it is important for the baby to experience the turning prior to birth without force, just as it is neurologically important for a baby to experience crawling before walking (Melillo & Leisman, 2009). The Eastern model provides options for supporting the turning process by tonifying meridians and cleansing the apana vayu. It is possible that Western approaches such as psychosomatic intervention (Linder, 2006), teaching mothers reflective functioning (Jenkins & Williams, 2008), and encouraging prebirth bonding (Bowen, 1988) could also support the process of turning to cephalic presentation along with neurostructural approaches such as chiropractic (Pistolese, 2002).

Strengths and Limitations

This was the first identified study to evaluate the Chinese medicine and Ayurvedic medicine models of risk factors for breech presentation, which point to specific maternal personality and behavioral characteristics as potential risk factors for breech presentation. This study was limited because it was retrospective with a small purposive sample. Although not a random sample, our mothers shared socio-demographic and obstetric history characteristics with mothers in the published literature (Albrechtsen et al., 1998; Peterson, 2010; Roberts et al., 1999). Additionally, our sample had STPI scores that reflected the norms for college women, Navy women, and working women in other studies (Spielberger, nd). While this suggests that our purposive sample could reflect population trends documented in larger studies, it does not guarantee that our results are generalizable.

Because this was a retrospective study it evaluated no physiological or prenatal attachment measures. A retrospective study design was selected because breech presentation is a relatively rare event, and in-depth interviews are construed by some participants as therapeutic. Information bias was limited in this study by triangulating data sources. Although I was not blinded in my roles as researcher and analyst, this limitation was somewhat offset by the

high value placed upon negative cases in the qualitative aspect of the research. Recall bias was limited by ensuring all participants had a baby within the past 12 months. We attempted to limit selection bias by making inclusion and exclusion criteria and recruitment strategies identical for cases and controls. It is notable that, while most characteristics of the cases reflected patterns observed in large studies, controls had worse health and pregnancy outcomes. Many of the mothers of cephalic presentation babies wished to participate in the study because they had a stressful pregnancy and did not have a breech baby. Thus, healthy pregnancies were under-represented among mothers of cephalic presentation babies. This suggests if differences were found between mothers of breech and cephalic presentation babies in this study, differences might be even greater in a more representative sample

Future Directions

The similarity between characteristics of mothers of breech babies in this study with those identified in Chinese and Ayurvedic medicine suggest it might be beneficial to further explore the modifiable risk factors for breech presentation as identified in Eastern medicine. The tentative association between breech presentation and attachment style could also be important to investigate (Mikulincer & Shaver, 2009) along with the influence that prebirth bonding has on birth presentation.

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