

A Head Start in Life?: Prenatal Parenting and the Discourse of Fetal Stimulation

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ABSTRACT

This paper explores the recent growth of pre-natal advice literature and commercial products that focus on the "problem" of fetal over and under-stimulation. I argue that in drawing upon recent medical research on the fetus, new areas of fetal life emerge, opportunities are defined, and the maternal-fetal relationship is re-articulated.

RÉSUMÉ

Cet article explore l'augmentation récente de la littérature sur les conseils prénataux et des produits commerciaux qui se concentrent sur le « problème » du manque de stimulation ou de la stimulation excessive des fœtus. Je dénote qu'en se basant sur les recherches médicales sur les fœtus, de nouveaux domaines de la vie des fœtus apparaissent, les occasions sont définies, et la relation mère fœtus est réarticulée.

INTRODUCTION

In recent years, revolutionary discoveries in neuroscience and developmental psychology have transformed our understanding of infant development. We now know that starting from conception, the infant brain is wired by the environment. Everything that the infant [sic] experiences in his [sic] mother's womb and after birth leaves a permanent imprint on his brain. (Verney & Weintraub 2002)

Several years ago, I saw a magazine advertisement for the "Tummy Tutor," a device designed to "stimulate in-utero learning." The Tummy Tutor is attached around the waist of pregnant women and contains a speaker that transmits recorded sounds to the fetus. Suggested forms of "stimulation" include the parents' voices, classical music, and foreign languages. At the time, I interpreted this device as an isolated phenomenon: a company trying to profit from the convergence between middle-class anxiety about children's competitive advantage, and the long standing, if vague, idea that playing music to the fetus will make a child smarter, or at least a better violinist. But advice about fetal stimulation has become increasingly widespread, relying on recent and emerging research in medicine and psychology. This paper explores the network of knowledge, practices, technologies, attitudes, and interventions that focus upon fetal brain development, health, and cognition.

In the endlessly expanding industry of pregnancy advice books, prenatal stimulation is presented as part of a broader programme of nurturing brain development and fetal health more generally. It is contextualized within now-familiar themes of protecting the fetus and its brain from toxins and nutritional deficiencies: don't drink, smoke, or do drugs, take folic acid supplements, and eat your greens. Research, advice and technologies of fetal stimulation represent a shift in the programme: they are not so much about protective measures to ensure a "normal" development of the fetus, rather, they are about *enhancing* development so that the baby/child is superior to others. Fetal stimulation advocates claim that these children will not only demonstrate improved mental capabilities after birth, but also improved physical coordination, alertness, and attention span; they will be calmer and happier than other babies (Van de Carr & Lehrer 1997, 4). Brewer is quite explicit on the advantages of fetal stimulation: "It won't necessarily make him a genius. What he will be, however, is a Super Baby, who has received the best possible start in life to help him become alert, sensitive, good-natured, content, compassionate and as bright as his genes and environment will allow" (1998, xii). This paper concentrates on some of the more popularized manifestations of research on fetal stimulation and optimization. Advice books emphasize interventions during pregnancy to promote or protect fetal brain and behavioural development; a variety of "prenatal education" devices facilitate stimulation; and prenatal programmes of various designs are marketed in

conjunction with the above books or draw upon a similar archive of knowledge on the fetus and fetal stimulation.

I begin with a brief overview of the science of fetal and neural development and its links to broader scientific research. I then locate my own analysis in relation to other work on science, pregnancy and the fetus. Next I argue that in the aforementioned advice books and devices, the study of fetal development is mobilized so as to generate both a problem (the under-stimulated fetus) and an opportunity (pre-natal enrichment/education), where neither existed before. The maternal body is metaphorically transformed into a "classroom" without a teacher. I then explore the rationale for and implications of some of the devices used to stimulate the fetus. In relation to these devices, the pregnant body is typically situated as an impediment or barrier to fetal stimulation, which thus needs to be mediated by technological innovations. I go on to examine another concept of fetal stimulation that works from an alternative starting point: the idea that negative emotions from a pregnant woman are transmitted to the fetus, leading to the *over-stimulation* of the fetal brain. Maternal emotions are seen to produce neurochemicals that are transferred to the fetus, with various health consequences. I conclude with a discussion of how fetal education is presented as liberatory knowledge in the context of the perceived disempowering consequences of genetic explanations of human health and behaviour. In contrast to simplistic nature/nurture binaries, fetal stimulation is regarded by many of its proponents as an empowering way to "nurture nature."

NETWORKS OF FETAL KNOWLEDGE

Although ideas about communicating to or stimulating the fetus have existed for centuries, current ideas of fetal stimulation merit closer scrutiny. A dense network of professional expertise, associations, technologies, and advice books has emerged, with the psychophysical health of the fetus as its focus. Over the past two decades a field of study has formed called "pre and perinatal psychology and health." It has spawned journals, associations, newsletters, and a biennial international congress, the first one of which was held in Toronto in 1983 (ISPPM web-site).

The origins of this "new" science are complex and worthy of much closer attention than I can devote in this paper. A wide range of disciplines including psychoanalysis, developmental psychology, embryology, neuroscience, and teratology have been involved for decades in the study of embryonic and fetal development, health, behaviour, and connections to later life. There are a few general points to make about this extensive and disparate body of literature. First, while not new, studies of the embryo and fetus have recently

received a large boost to their dissemination and authority due to intensified medical and cultural preoccupations. Technologies such as ultrasound, combined with struggles over reproductive choice, have been implicated in the "personification" of the fetus in dominant North American culture (Petchesky 1987). However, there have been other developments in medical science that have opened up embryonic and fetal development to an ever more precise knowledge and scrutiny. To name just one, the general assertion of the 1970s that alcohol was a fetal teratogen has seeded current studies on the precise timing of embryonic/fetal "critical periods" or "temporal windows of vulnerability" of the central nervous system to alcohol (Goodlet & Johnson 1999, 59-62).

A second important area is the exploding research on "fetal programming." Sometimes called "prenatal programming" or "the fetal origins of adult disease," such research has made claims regarding the fetal origins of later health conditions, ranging from hypertension and high blood pressure to obesity and depression (Barker et. al 1995; Nathanielsz 2001). While the major focus of fetal programming has been the effects of poor maternal nutrition and toxins, a third area, maternal stress, is also identified as a source of later psychological problems in children and adults. Referring to the origins of cardiovascular disease, type-two diabetes, and osteoporosis, the web site for the recently formed Centre for Fetal Origins of Adult Disease notes:

This has led to the hypothesis that these diseases originate through adaptations which the fetus makes when it is undernourished, and which permanently change its structure, physiology and metabolism. Because there are critical periods in development, when certain developmental changes must occur, changes in fetal nutrition can result in irreversible changes.

It is this concept of critical developmental periods that sets the stage for the advice literature and devices that I explore here.

THE PRODUCTION OF FETAL SUBJECTS

As a sociologist of reproductive science and medicine, my entrance into fetal stimulation is via the constructionist insight that contemporary perceptions of pregnancy and the fetus are neither timeless and trans-historical nor have they emerged in a neutral vacuum of scientific discovery. Medical expertise and authority cannot be separated from social expertise and authority. For instance, the pre-condition of having social and legal "conflict" between women and their

fetuses is the medical and psychological knowledge of the fetus that renders it visible, vulnerable, and in this case, in need of more or less stimulation. Though I certainly have opinions about the efficacy of fetal stimulation, my goal is not to answer the question "does fetal stimulation really make your child smarter and better adjusted?" but to draw "attention to the fundamental role that knowledges play in rendering aspects of existence thinkable and calculable, and amenable to deliberated and planful initiatives" (Miller & Rose 1992a, 3).

Knowledge and technologies of fetal stimulation construct the fetus in certain ways and in a certain relation to pregnancy, women, families, and broader socio-political relationships. While parts of this knowledge are currently challenged in the broader medical community (Moon and Fifer 2000), nevertheless it continues to be gathered, organized, and disseminated into popular advice books, consumer products, and magazines. Its truth or falsity is secondary to the "truth effects" that it engenders. Drawing on the work of Michel Foucault, Miller and Rose explore the idea of a "problematization": "the way in which experience comes to be organized so as to render something a 'problem' to be addressed and rectified: interpretative schemes for codifying experience, ways of evaluating it in relation to particular norms, and ways of linking it up to wider social and economic concerns and objectives" (1995, 429). I see fetal stimulation discourse as articulating a particular problematization of the fetus and pregnancy: a fetus in need of more or less stimulation set in relation to certain proposed standards of "pre-natal parenting."

Feminist scholarship provides the most extensive body of literature on pregnancy and the fetus, though little attention has been devoted to fetal stimulation per se. There is, however, a dynamic body of research focussing on various social and political dimensions of pregnancy and the fetus. To touch on a few areas, the expanding medical research on reproductive toxins and the social and legal responses to substance-use during pregnancy have led to critical explorations of the constructions of maternal/fetal conflict in pregnancy (Chavkin 1992; Golden 1999). The increased medical and public utilization of fetal imaging technologies has made significant contributions to the discourse of fetal personhood (Franklin 1991; Petchesky 1987). Finally, work on the regulation, government, and power/knowledge relations of pregnancy have emphasized that different ways of knowing the fetus and pregnancy are intimately bound up with certain identities and forms of political authority (Morgan & Michaels 1999; Ruhl 1999; Weir 1996).

The material I am working with is centered on pregnancy and early child advice books, and includes the marketing material for the various devices that

facilitate fetal stimulation. Mitchell (2001) observes that the number of pregnancy and childbirth advice books has expanded significantly since the 1980s, and engagement with written material on these topics while pregnant is almost a given in Canada. Ruhl draws attention to the relations of knowing and governing that operate in "advanced liberal" societies at this time: "To govern in an advanced liberal way is to presuppose the implantation of certain norms of self-promotion in these actors, and a willingness to turn to experts for advice in the decisions, both large and small, that are entailed in the conduct of the enterprise of one's life" (Rose & Miller 1994, 60; cited in Ruhl 1999, 101). Ruhl posits that pregnancy is governed through a discourse of risk that individualizes responsibility and entails practices of self-discipline in its subjects. While risk discourse is not highlighted in the promotion of fetal stimulation, Ruhl's insight that popular pregnancy advice books "provide a measure of what the ideal of responsible behaviour might be for a pregnant woman" is instructive, suggesting an idealized "model" of pregnant comportment and care typical of advanced liberal governance (103-104).

USE IT OR LOSE IT: DEVELOPMENTAL "WINDOWS OF OPPORTUNITY"

The discourse of fetal stimulation grounds itself by presenting "truths" of fetal neurological and psychological development. Readers are introduced to the stages of development, with a specific emphasis on brain and cognitive development and functioning. Simplified sketches of the embryo/fetus at different stages are often provided (Van de Carr & Lehrer 1997, 43-47). In some cases, only images of head and neural development are provided, signaling the particular importance of this part of the body (Brewer 1998, 3-30; Diamond 1999, 3). For example, we learn that by twenty weeks gestation,

Most of the axons growing out from the neurons in your baby's brain have arrived at their destination and the basic diagram for the neural network is in place. Some evidence suggests that your baby starts hearing sounds from your environment from this stage onwards. The cartilage surrounding the inner ear starts to turn to bone now and his ears are almost fully formed and in the right place. (Brewer 1998, 19-20)

Descriptions of fetal development are in part oriented towards the potential to receive stimulation: we find out when the taste buds and olfactory nerves start to develop, when temperature and pain can be felt, when the retina develops, and when the fetus reacts to touch.

Stages of development are then linked to specific "windows of opportunity" for stimulating the fetus in certain ways. Van de Carr and Lehrer (1997) are particularly focused on stimulating as many of the senses as possible, leading to this (serious) depiction of their "prenatal classroom" programme:

The lesson went on to introduce different kinds of contact - patting, rubbing, squeezing, shaking, stroking, tapping - and the accompanying verbs, delivered via paper megaphone. Jeannine [the mother] would stand up, sit down, sway, or rock and say the appropriate verbs. She would drink hot and cold liquids and label the sensation for Lisel [the fetus]. Tony [the father] would turn on a radio speaker ("Music!") or a vacuum cleaner ("Noise!"), or shine a flashlight on and off ("Light!" "Dark!" "Light!" "Dark!") Every ten minute session, morning and evening, would begin with the "Hi Baby!" megaphone greeting and end with a few minutes of classical music piped in through headphones (Diamond & Hopson 1999, 86-87).

Brewer identifies another key period of development that starts at 36 weeks gestation:

During fetal development, your baby's brain produces at least twice as many brain cells as he needs. The excess cells are only loosely wired in. If they do not make a certain minimum number of connections with other brain cells, they will eventually wither and die *just before your baby is born*. At least 40 per cent and sometimes as many as 75 per cent of brain neurons are lost during prenatal development, most during the eighth month of pregnancy. You can help minimize this loss by... (1998, xi; italics in original)

Thus Brewer introduces her programme to "boost your baby's potential," the first priority being to provide "a stimulating environment for your baby" to control this process of cell death. The rationale here is that "saving" more brain cells is equated with more neural connections and greater child potential. In addition to talking, touching and playing music to the fetus, Brewer is an advocate of the "BabyPlus" electronic device that is programmed to transmit to the fetus rhythms based on the maternal heartbeat. Called the "Cardiac Curriculum," its creator claims that,

if an increased number of neurons (brain cells) and their beginning connections (axons and dendrites) are engaged during their most

plastic and receptive developmental stage - the prenatal period - greater strength in the structure will result, much like exercising a muscle. The goal of prenatal stimulation is to withstand the normal process by which at least 50% of all fetal brain cells atrophy before birth. (Logan 2002)

The passages cited above work to transform a previously unproblematic process of fetal development into a problem and an opportunity. The language in these texts suggests that in order to give a child a head start in life, pregnant women can and should begin a process of stimulation before birth. Indeed, if this is not done the "window of opportunity" will shut and the chance will be lost forever. Isaacson, in her excellent exploration of the "changing classifications of in utero development in medical texts," gives perspective to the creation of these windows through her analysis of the development of what she calls the "fetus-infant." She identifies a shift in the cognitive orientation of obstetrical texts from a focus on "gestational time" to one based on morphological, and finally "functional time," with a focus on the functional maturity of the fetus (1996). This shift in orientation is certainly not confined to the writing of obstetrical textbooks nor the obstetrical interventions on the fetus that Isaacson explores. I would argue that writings on fetal stimulation are based upon the important periods of functional development of the fetus: when and how the brain develops, and when the various senses develop. This way of knowing and classifying the fetus renders plausible statements like "behaviourally speaking, there's little difference between a newborn and a 32-week-old fetus" (Hopson 1998, 44). In this example, the categories of fetus and infant are blurred by a functional framework that ascribes the same behaviour to both.

For those who are skeptical about the need for prenatal stimulation, a considerable array of anecdotal evidence is provided to demonstrate its effectiveness. In chapter three ("Feed My Brain") of their work, Diamond and Hopson use a particularly effective rhetorical strategy that describes different "scenarios" of prenatal care and babies' outcomes. By contrasting an "ideal type" prenatal scenario with a "typical" one and a "bad" one, the authors convey the immorality of bad prenatal care and more importantly, the mediocrity of the average. The stories act as a disciplinary narrative, providing readers with three "choices" of prenatal comportment and care, only one of which is the right choice. First we meet Lisel, the planned offspring of an enthusiastic heterosexual couple. Her mother ate well, paid attention to important nutrients, avoided chemicals, food additives, smoke and alcohol. She quit work two months before Lisel was due to avoid stress. She and her

husband used Van de Carr's prenatal enrichment programme in the third trimester of her pregnancy. Lisel was born well developed and advanced physically compared to most children: "she lifted her head three weeks sooner than the average baby, and rolled over, sat up, talked, stood, and walked earlier than other infants of her age" (1999, 65). Next comes the "more typical" pregnancy experience of Denna, a pregnant woman who was a busy working nurse. Denna "took good care of herself" but had a stressful job, and this stress was compounded when the father of her child left part way through her pregnancy. Denna worked right up till she delivered, and drank coffee and smoked occasionally while on shift. Her son Albert "is a quiet, sweet-tempered boy. He earns average grades. He likes to play soccer. And he is very devoted to Denna" (66). Thirdly there are Jack and Joan, young, "a bit wild," and accidentally pregnant. Joan consumed alcohol in the first trimester of her pregnancy, tried to eat well but ended up mostly eating fast food, pop and doughnuts. She snorted a lot of cocaine near the end of her pregnancy, went into premature labour, and her son "Jeremy was born paralyzed on his right side" (66). These scenarios express the sense of urgency as well as the competitive individualism that is embedded in contemporary middle class social contexts. "Average" Albert represents a barely acceptable outcome. Brewer explains:

Such a programme [her prenatal and early child enrichment advice] is likely to give your child a minimum 10-point IQ advantage over what he would otherwise have achieved. This may represent the difference between an A, B, or C grade in formal examinations. More importantly, however, it may make the difference between a pass and a fail. That chance has to be worth it for any child. (1998, xii)

Nadestan's study of brain science and the mentality behind infant development toys can be extended to the study of fetal development strategies. She suggests that the parental obsession with one's children "exceeding the norm" has to do with the "current pre-occupations [that] are primarily driven by the ascendancy of the entrepreneurial, gold-collar 'knowledge worker', a new subject position that emerges at the intersection of contemporary discourses/practices of technology, entrepreneurial capitalism and consumer culture" (2002, 412). Nadestan calls this infant the "entrepreneurial infant," an intelligent and socially skilled being able to meet the demands of the middle class modern world. Nadestan's infant resonates with the smart, but also socially and emotionally well-adjusted, infant and child articulated in prenatal stimulation

material:

Modern psychology and the business world are beginning to appreciate that there is more to success than academic performance. A brilliant scholar may not be successful in the business world because he lacks the emotional skills that are needed for effective leadership. You have the opportunity to give both of these "quotient gifts" [the intelligence and emotional quotient] to your unborn and newly born child. (Wirth 2001, 32-33)

Fetal stimulation discourse presents itself as being the key form of psychological "enrichment" in life. However, when contextualized in the broader marketing literature on child education and enrichment, one can see that it is but one aspect of a very wide range of practices and products focused on giving one's offspring every possible intellectual, social and emotional advantage early education can buy. Although it is far from being a normative practice, fetal stimulation draws attention to the types of social and economic advantages that one is likely to need in order to provide the "ideal" prenatal care and stimulation outlined in the above material. Ever-expanding amounts of time and money must be spent to facilitate prenatal stimulation. Taylor makes the observation that "Americans take for granted that consuming on behalf of one's children is an important parental responsibility" (2000, 398), and this observation can certainly be extended to Canadian middle-class urban parenting. Product-oriented websites introduce visitors to an array of books, videos, games, and other products dealing with a full range of age periods, from fetal up to age three. These are far from being unified, and one is left to negotiate through often competing claims attached to products in an attempt to find the best knowledge and products for one child, infant, and fetus. In addition to financial resources, social resources are needed to manage and avoid stress, substance use, and toxins. Chavkin has drawn our attention to how a woman can be seen as being in conflict with her fetus if she does not follow medically and legally-sanctioned behaviour (1992). Furthermore, failure to do so inevitably has differential consequences for those who are economically and socially disadvantaged. The requirements and resources needed to carry out an ideal-type pregnancy are worth pausing to reflect upon.

TECHNOLOGY AND THE PREGNANT BODY

Having established the fetus as under-stimulated in the womb, it is of particular importance to examine how the proposed solutions to this new problem situate women and those around them

in relation to the activity of education and stimulation. "The Fetal Phone" offers an image on their web page that is particularly evocative of the perceived necessity of technological mediation for communication between a woman and her fetus. The image depicts a woman talking into a hollow "microphone" tube that is connected to a hose pipe in turn connected to a large cone she is holding on her belly. "Send your voice straight to your baby in the womb," it encourages (Fetalphone, 2002).

Interestingly, the marketing of many fetal education products constructs the maternal body as a hindrance to communication with the fetus. The technology and techniques are thus designed to circumvent the barrier to stimulation that is the maternal body. Duden articulates how, although women have been constructed as "vessels" of reproduction for some time, the decision to take on the identity of a "uterine environment" is a relatively recent form of subjectivity (1993, 54). In fetal stimulation discourse, one might expect pregnant women to be particularly well-positioned to be the "teacher" in the "prenatal classroom." In the case of "The Fetal Phone" marketing at least, the error of this assumption is presented thus: "Your voice, like all sound waves, is naturally broadcast in a wide, outward projection. Therefore, when the mother attempts to talk to her unborn child in a normal speaking voice, the sound is broadcast outwardly and not directly towards the baby. For the most part, the sound of the voice is lost" (Fetalphone 2002).

Van de Carr and Lehrer (1997, 49-50) also emphasize to women the need to "direct and amplify" their voice, recommending the use of a megaphone or paper tube if speaking loudly seems unfeasible. Significantly, "dad or another helper" actually has an *easier* time with fetal communication than the pregnant woman, being able to position their head much nearer to the head of the fetus. This material raises one of the more obvious consequences of the technological mediation seen in the fetal stimulation literature: men (particularly, the almost inevitably present father) can now get in on the action of fetal stimulation. Although women continue to have the ultimate responsibility for stimulating the fetus, it is curiously separated from the maternal body, and men or their technological stand-in appear as well positioned helpers in the project of "fetal ed."

MATERNAL EMOTIONS AND OVER-STIMULATION

The opposition between a positively positioned male rationality and negative female emotionality is highlighted in that branch of fetal stimulation discourse which warns of the significant health consequences for the fetus of the *negative*

emotions of women during pregnancy. The positive stimulation provided by prenatal programmes and technology is in stark contrast to the stimulation from too much of women's negative emotions. Several of the books examined in this paper spend considerable time explaining an area of research that has taken off since the 1990s: studies in the neurochemistry of maternal emotions and the consequences of them for the fetus.

Everything the pregnant mother feels or thinks is communicated through neurohormones to her unborn child, just as surely as surely as alcohol and nicotine. Just as a computer virus gradually corrupts the software of any system it infects, so, too, maternal anxiety, depression, or stress alters intelligence and personality by gradually rewiring the brain. (Verny & Weintraub 2002, 10)

The consequences as presented are considerable. Wirth (2001, 39-47) claims that negative maternal emotions like stress can "condition" the fetal brain, making a baby and child more prone to stress, impulsiveness, aggression, and depression. Janov (2000) associates consistent negative maternal emotions during the fetus' "womb-life" with all sorts of "problems" later in life: stress, poor pain tolerance, alcoholism, criminality, schizophrenia, suicide, and homosexuality. Verny and Weintraub (2002, 208) elaborate further with a far-reaching causal chain:

Early stress produces neurophysiological deficits that render children excessively impulsive and irritable. Their condition is further aggravated by a chain of linked factors consisting of poor language skills, poor abstract reasoning, inability to concentrate, and lack of interest in reading. In concert, these factors inevitably lead to academic failure and early dropping out from school, which in turn often lead to a life of addiction and crime.

Some of those that write about the impact of maternal stress on fetal health say that these discoveries may seem "unfair" to pregnant women. They may make vague gestures towards more societal support for pregnant women. Ultimately, however, this advice literature ends up with individualized solutions focused at the intended reader of these books - pregnant women themselves. Nathanielsz offers advice on "stress-fighting techniques" like exercise, meditation and yoga to help control stress and reduce its impact while making comparisons to women's previous resistance to medical knowledge about the dangers of alcohol or tobacco to the fetus (2001, 96-110). One half of Wirth is spent on

"The Inner Journey to Parenting Your Unborn Child," a process that involves extensive personal transformation for the sake of the fetus. After emphasizing the importance of building up the psychological skills necessary to deal with negative emotions and attitudes, Wirth offers a series of detailed psychotherapeutic exercises designed to send "positive neurotransmitters" to the fetus (2001, 166-169). After all, "Ignoring your unborn child is like leaving him alone in his room for nine months. He has emotional needs just like the rest of us. Pregnant families should give their unborn children as much psychological countenance as they can muster during this critical period of neurological development" (168).

Let me sum up this section with two observations. First, in looking at the literature on fetal stimulation it is hard not to note what is at best a painful irony. On the one hand this material presents a pregnant woman's conscious stimulatory relationship to her fetus as impeded by the "barrier" of her body; yet at the same time everything she feels is claimed to be automatically and involuntarily transmitted to the fetus, to its significant detriment. Second, birth becomes an increasingly insignificant event in terms of the status of the fetus in this literature; it traverses this boundary with ease.¹ The idea of moving "parenting" of ones "child" further and further *back* in the pre-birth process of reproduction appears at the same time as the idea of extending *forward* the need for care and intervention based on the specific idea that the embryo/fetus and even infant is particularly vulnerable because it is in the process of developing. Nathanielsz calls the months after birth "the fourth trimester," signaling how infants continue to need special attention to "program" their developing health (2001,189). Whether this literature is infantilizing the fetus or "fetalizing" the infant, whether it advocates extra stimulation or efforts not to over stimulate, what is shared is an orientation towards fetal optimization² based upon very specific stages of embryonic and fetal development.

CONCLUSIONS

This paper has charted out some key features of what I have called the discourse of fetal stimulation. Within this discourse fetal stimulation is articulated as "liberatory" knowledge in the face of the "disempowering" idea that our genetic makeup determines our health and who we are from the start. The promotion of fetal stimulation, and indeed, the concept of fetal programming, invites parents (as well as educators and government) to see fetal stimulation as an *opportunity for action*. This highlights the positivity of this knowledge (it is productive and creative, not prohibitory), for in contrast to a nature/nurture binary, we are presented as being able to nurture our nature

through the knowledge and practice of fetal care.

The fetal stimulation literature articulates this new knowledge of the fetus and pregnancy as increasing the responsibilities of women, but also as giving them and "society" a great opportunity. Although fetal stimulation is an individualized responsibility, some authors are not averse to drawing broader social conclusions:

More than anyone else in our society, it would help if more lawmakers were trained to know how our bodies work, the conditions that enable our children's brains to develop optimally and how stressful situations negatively impact the health of women both before and during pregnancy. Since these effects can span generations, they affect generations of citizens and generations of economies. (Nathanielsz 1999, 266-267)

Neo-liberal discourse runs through this material to the extent that individual responsibility is accorded primacy in explaining how to help your offspring to get ahead in life. As a model of "education," this literature places the work parents do prenatally as a pivotal factor in academic (as well as social) success and failure. Furthermore, for parents, "super babies" are held out as a solution to many daily trials and tribulations of child rearing: they grow up quickly, are self-directed, well behaved, sociable, happy, and healthy. One can read the discourse of fetal stimulation as evoking an idealized *opposite* to the common media portrayal of the "child who was damaged from the start" found in representations of children and adolescents with FAS (Fetal Alcohol Syndrome): the child that gets poor grades, drops out of school, gets involved in criminal behaviour, and either goes to jail or is dependent on you for life. Finally, fetal stimulation discourse resonates closely with the message of economic self-responsibility seen in advertisements for retirement investment: you put your money/parenting into them at an early stage/age, and with the miracle of compound interest/pre-natal enrichment, you can stop investing/parenting much earlier than most and reap the long term rewards.

Following Weir (1996, 389), the present study is intended as a contribution to the ongoing inquiry on the discursive construction of pregnancy and the fetus. It highlights the mobilization of medical and scientific knowledge and expertise in rendering the fetus as a subject and object of intervention. Through the mobilization of atrophying or overwhelmed fetal brains "socio-political objectives and the minutiae of daily [pregnant] existence" (Miller & Rose 1992b, 182) are linked, and new areas in the maternal-fetus relationship are problematized

ACKNOWLEDGEMENT

Thanks to Sara Booth, Rebecca Raby, Kate Story, Lorna Weir, and especially Andie Noack for comments and support in writing this article. Further, I am most grateful for the comments and criticisms provided to me by *Atlantis* reviewers and editors.

ENDNOTES

1. Much more work should be done on this literature with respect to its origins, impact, and positioning on issues of abortion and reproductive choice. As long as North American abortion debates continue to be framed in the context of the rights of fetal persons in conflict with pregnant women, any research on the sensory, cognitive, and emotional development of the fetus is of course part of these debates.
2. I am borrowing the term "optimization" from Foucault's discussion of the anato-mo-politics of the human body, as it seems to capture aspects of the maternal-fetal relationship in this literature. Foucault talks about the development of power over life "centered on the body as a machine: its disciplining, the optimization of its capabilities, the exhortation of its forces, the parallel increase of its usefulness and its docility, its integration into systems of efficient and economic controls" (Foucault 1978, 139). Thanks to Lorna Weir for drawing my attention to this.

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