

## **Enhancing Early Speech, Parental Bonding and Infant Physical Development Using Prenatal Intervention in Standard Obstetric Practice**

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### **Introduction**

Over the past 10 years there has been an exponential increase of our knowledge and awareness of fetal-sensory capability and consciousness [Verny and Kelly (1981), Chamberlain (1983)]. Interest in the possibility of the effects of prenatal-fetal stimulation upon fetal learning has been investigated by Verny et. al. (1981), DeCasper (1985) and Van de Carr, Lehrer & Van de Carr (1984). Most studies in this area have concentrated upon laboratory investigation of fetal capabilities and potential ability to respond to prenatal interventions [Sontag (1944), Spelt (1948), Jensen and Flottrop (1982)]. Investigators have also been interested in how parents and infants initially bond after birth [Klaus and Kennell (1982), Swanson (1978), Peterson and Mehl (1978), Sveja (1980)]. Until recently these studies have primarily concentrated upon the mother's role in bonding with her newly born infant. The fathers role in becoming acquainted with his new offspring has received little or no attention until quite recently [Greenberg and Morris (1984)]. Most of the studies on parent-infant bonding have concentrated upon the emotional readiness of parents prior to the birth of their babies in relation to how parents rated their interaction with their new babies [Roberts (1983)] or in programs designed to enhance emotional bonding after birth by enhancing emotional bonding prior to birth such as the small group study by Carter-Jessop (1981).

The Prenatal University program as started by Van de Carr (1979) is unusual in that it has been exclusively used in private medical and birthing practices with patients who are undergoing regular obstetric care prior to the birth of their infants. Thus, it represents applications

of prenatal stimulation to the general population and is meant for clinical use. The program presents materials designed to enhance fetal development, early communication, brain growth, and to promote better health practices during pregnancy. Parents who use this program receive this information.

The formal aspects of the program include an instruction manual that is given to parents at 3-4 months before the expected due date of the baby, a video tape that is viewed in the physician's office, a brief question and answer period with the primary physician, and audio tapes of the manual if requested. The instruction manual for prenatal enhancement includes exercises designed to create paired associations between words spoken by the parents and simultaneously presented physical actions, tactile and visual stimuli. The program also presents guidelines to assess optimal fetal responses, recommendations for proper diet to keep mother in good health, and suggestions for supplements to promote brain growth in the fetus.

The manuals are written in easy to understand language to maximize use by parents of varied educational backgrounds. The exercises are also designed to aid in mother-infant bonding and father-infant bonding as the parent does the exercise in cooperation with other family members and learns to treat the fetus as a developing organism with an individualized reactivity to the presented stimuli.

Cooperative activities and role modeling prior to the birth of the baby are also designed to promote communication and to develop parent responsiveness to fetal activity as a model for later positive interaction with the infant. [Van de Carr and Lehrer (1984)]

We have recently added a second instructional manual and series of exercises for the first 4 months following birth. The emphasis in this part of the program is on providing continuity for the presented word lists from the prenatal period and to further enhance early decision making capabilities in the infant. The philosophy of both instructional manual deemphasizes the notion of "packing" the infant with stimuli and, instead, uses the fetal and infant responses as guides for presenting enhancement exercises [Van de Carr and Lehrer (1984 c)].

Currently, the Prenatal University program has been used with over 700 families. This data base represents a special population for investigation of the effects of prenatal stimulation upon a number of physical, sensory, cognitive, emotional, and interactive factors in the birth process and early infancy. Recently, a number of physicians and birth centers have begun using the program materials so we expect to be reporting upon the effects from a growing population of stimulated infants in the future. Our most recent findings show that the program is also effective when applied in economically stressed populations [Van

de Carr (1985) and Van de Carr et. al. (1984 b) Spanish version].

For the purpose of this article we are reporting a sampling of results drawn from a longitudinal study that is currently in progress. We choose to select a few items for comparison which demonstrate aspects of the areas we are investigating. These include the onset of early speech and communication abilities in infants who have received the Prenatal University program during the mother's pregnancy; facilitation of mother-infant bonding as measured by ease of breast feeding; facilitation of father-infant relationship as perceived by the mother; and early physical development as measured by the emergence of teeth in the infant. These items are representative of a number of additional factors we are investigating with this population of infants.

### **Methodology**

Our hypotheses are that prenatal intervention (i.e. the use of a prenatal program by parents) enhances aspects of:

- 1) Fetal development leading to increased early infant responsiveness and capability.
- 2) Health practices during pregnancy.
- 3) Formation of bonding between infant and mother, providing mother and infant with more opportunity for developing a productive relationship and reducing maternal stress levels.
- 4) Father's willingness to become involved during early infant care, further supporting mother's role, and, in addition, increasing father's ability to support the infants developmental progress and reducing paternal stress levels.
- 5) Maternal and paternal responsiveness to infant's activity and needs, resulting in improved parenting skills.

In order to test aspects of these hypotheses we selected four items for comparison from a much larger questionnaire. The questionnaires were mailed to parents who were patients in the private obstetric practices of two physicians using the Prenatal University Program. These patients were drawn from a metropolitan population representative of a normative population in the greater Bay Area of Northern California. Mailings of questionnaires went to all patients in the obstetrics practices who had youngsters who would be six months to three years old at the time of the mailing. The questionnaires included background information, parents' use of prenatal programs and other prenatal activities, attitudes

and feelings about obstetric care and birth experiences, onset of physical, sensory, motor, communicative, and cognitive capabilities of the infant, quality of feeding, play, toilet training, and responsiveness to pain, and perceived relationships between baby and mother and baby and father.

Three groups were formed from the respondents. Raters, who were uninformed as to the identities of the respondents, determined if the respondent used the Prenatal University Program two times per day (the currently recommended time is two times per day for five minutes each time) (FP group, i.e. full participants); less than two times per day and more than one time per week (PP, i.e. partial participants); or did not use the program at all (NP, i.e. non participant).

The first 50 respondents in each group were selected for evaluation on questions drawn from the comprehensive questionnaire which would test the following factors:

- A) First communication as perceived by mother (early speech factor).
- B) Ease and duration of breast feeding (mother-infant bonding factor).
- C) Father's relationship with infant (father-infant bonding).
- D) Emergence of baby's first teeth (physical maturation of infant).

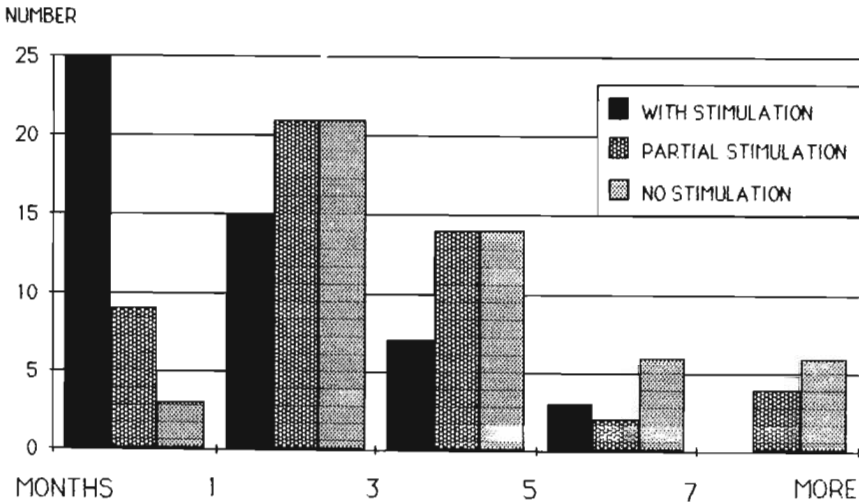
## Results

The three groups of 50 respondents each were compared using tests for each question. The results of the analysis is as follows:

The results of all of these comparisons were statistically significant at .05%.

The consistent finding was the enhancement of early infant communication and aspects of maternal and paternal bonding in the FP group as compared to the NP group. A similar although less enhanced effect was found in the PP group compared to the NP group. In addition to being statistically significant, the observed differences in mean scores are also clinically significant, showing a clearly superior pattern of early infant capability, development, and family bonding patterns in the FP and PP groups as compared to the NP group. These findings are consistent with other aspects of our study as well. Also consistent with these results were written accounts of the infants capabilities and relationships with parents.

### BABY'S FIRST COMMUNICATION

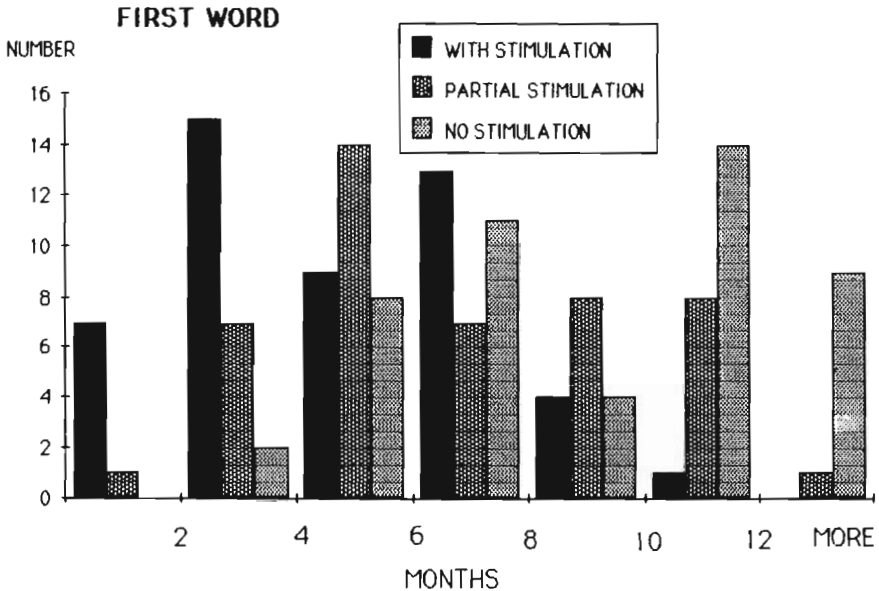


Factor 1 (Early infant speech)  
 First attempt at saying a word

FP = Full Participant  
 PP = Partial Participant  
 NP = Non Participant

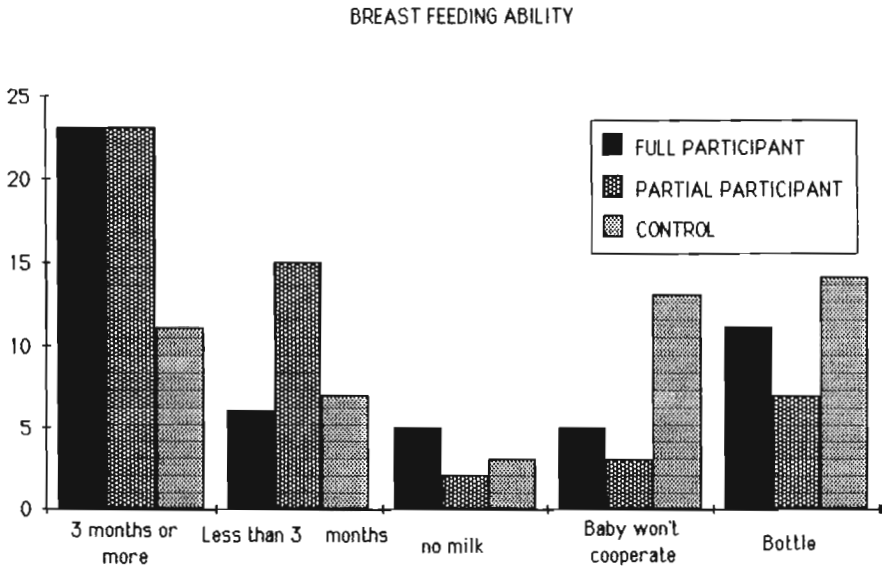
### Discussion

The sampling of results in this brief report are remarkably consistent in demonstrating a range of positive effects in infants who were given a prenatal enhancement program presented as part of regular obstetric practice. First, early attempts at communication and recognizable spoken words occur much earlier in the prenatally enhanced infants. Second, mothers nurse these infants longer and are far less likely to blame the infant for difficulties in breast feeding. Third, fathers are seen as developing a stronger than average relationship with these infants. Finally, teeth develop more quickly in these infants and in a surprising number of instances were present at birth.



Several factors seem worthy for discussion. In our study the early speech factor could measure a) early instances of communication in the prenatally enhanced infants; b) a tendency for parents to be more observant and expectant of early speech and, thus, recognize attempts at communication and early utterances in their infants before parents who were not looking for these signs; c) effects of early infant training by parents who had followed the prenatal enhancement program during pregnancy and continued it during early infancy, or d) an artifact of parents wanting to believe that their infants were communicating at an earlier than expected age.

Videotapes in our possession of babies saying words at four months and younger and numerous personal reports and observations of these infants lead us to believe that some combination of true early communication, better observation, and continuing instruction by the parents of the prenatally enhanced infant account for the emergence of early communication skills in these infants.

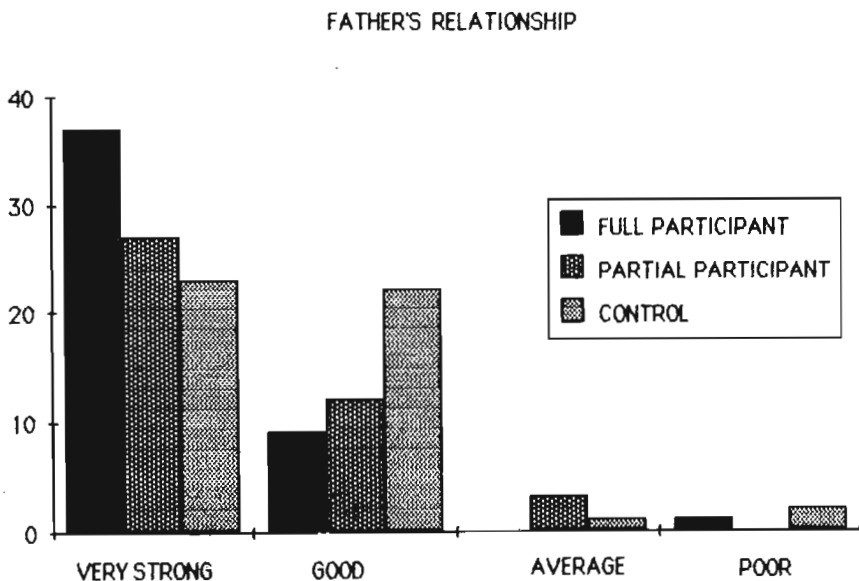


### Factor 2 (Maternal Bonding)

#### Ease and duration of breast feeding

The results of the items involving breast feeding show important relational differences between mothers who had used the prenatal enhancement program in comparison to mothers who had not used the program. First, mothers who used the program were far more likely to continue breast feeding over three months than mothers who did not use the program. We consider this to signify the development of a closer and more intimate relationship between mother and developing infant. Second, mothers who used the program were far less likely to blame if there was a problem in initiating breast feeding. We feel that this finding has even more significance in demonstrating the beginnings of a more positive maternal bond in those families which used the prenatal enhancement program.

The results concerning the father's relationship with the baby show an enhancement of the father's relationship with the baby as evaluated



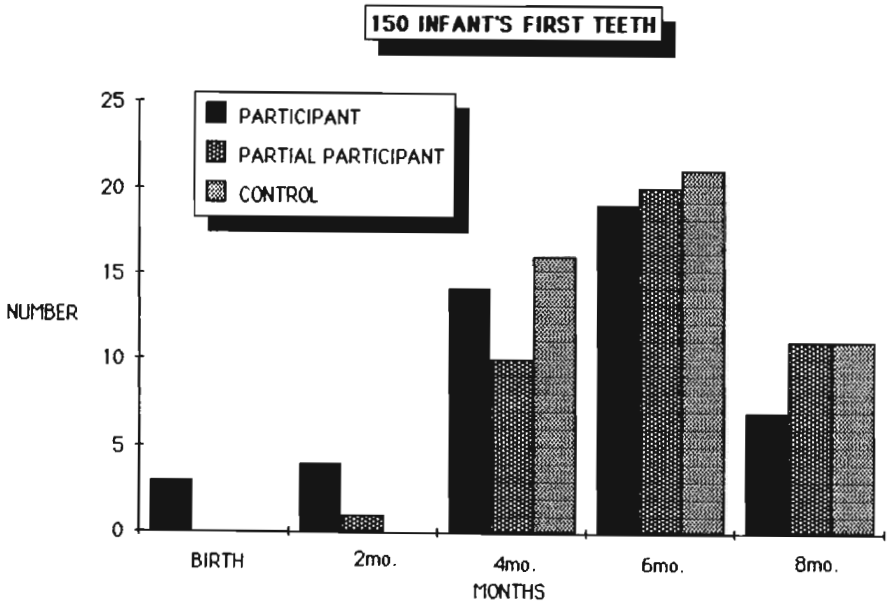
### Factor 3 (Paternal Bonding)

Husband or partners relationship with infant

by mother. We feel that this finding demonstrates the effects of both a better relationship between father and infant in the prenatally enhanced groups, as well as pointing to a better coordinated relating between parents of these infants. The Prenatal University program has father doing the same exercises with the fetus as mother does and learning to coordinate his efforts with her before the baby is born. We feel that this helps parents learn to support each other before the times of maximal stress and disruption of their routines that typically occur after the baby is born.

Finally, the results of early development of teeth are most interesting. In our group of 100 prenatally enhanced youngsters there were three instances of babies born with teeth (all in the full participant group). There were a total of eight babies in the FP and PP groups who had teeth by two months (4 FP & 1PP). There were no differences in length of pregnancy between the groups so we cannot ascribe this finding to





#### Factor 4 (Physical Development)

##### Emergence of baby's first teeth

the effects of longer in utero maturation. Massler and Sarava (1950) report that the normal instance of teeth by one month is 1 in 2000. Our findings in this sample of the Prenatal University population is 8 in 100. This is quite a remarkable difference. We feel that the Prenatal University program has effects that are attributable to both fetal stimulation and superior fetal environment. Parents using the program are likely to eat better, smoke less, and drink alcohol less. We therefore see the finding of early development of teeth as possibly indicative of nutritional enhancement or a result of developmental acceleration. Interestingly, the mothers of these infants reported no difficulties with breast feeding.

## Conclusion

Our findings as reported in this article are taken from an ongoing larger study which is showing similar results. It is our conclusion that the Prenatal University program produces a number of remarkable effects in the developing infant and infant-parent interactions. The program is meant to take only five minutes twice per day during the last three to four months of pregnancy and is designed to be used in connection with standard obstetric and birthing center practices. A second and even more meaningful conclusion from these findings points to a rethinking of our notions of early infant capabilities and ways to enhance early parent-infant communication.

A great many of the normative findings about early infant capabilities have come from observations of previous generations of heavily medicated birthing practices of the 1930s, 40s, and 50s. These clinical practices tended to depress the newly born infant's abilities for learning. Our findings indicate that not only the infant, but the fetus as well, is far more capable of learning than we have previously thought. In addition, we would strongly recommend promoting educational programs for new parents before the baby is born rather than waiting until after the birth of the baby. The methods used in the Prenatal University program emphasize cooperative relating to the baby before it is born as a vehicle for helping develop better parent-parent communication as well as promoting better parent-infant bonding. Additional findings, from the other parts of the study we have mentioned.

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