Final Project Report

# *Understanding the Intergenerational Transmission of Violence: From Pregnancy Through the First Year of Life**

U.S. Department of Justice Grant No. #98-WT-VX-0021

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**FINAL REPORT**

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*Note: the views are those of the authors and do not necessarily represent the position of the National Institute of Justice or the Department of Justice.

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# EXECUTIVE SUMMARY

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The purpose of this grant was to begin a longitudinal study to examine the effects of witnessing and experiencing domestic violence on infants and their mothers. This study was unique in that it was a prospective design that: (1) studied domestic violence at the earliest point at which it might affect a child--*in utero* and (2) elucidated the mechanisms by which violence is transmitted intergenerationally by examining three mediating variables: parenting behavior, maternal physical health, and maternal mental health. Data collection began during the last trimester of the woman's pregnancy and followed her and her infant throughout the first year of the infant's life.

## Specific Aims of this Study

- To examine the effects of domestic violence (pre- and postnatal) on three infant outcomes: physical health, social development, and cognitive development
- To examine three factors that may mediate the relationship between battering and infant outcomes: 1) maternal physical health, 2) maternal mental health, and 3) parenting behavior
- To examine the *mental health* effects of battering during pregnancy
- To inform criminal justice policy regarding families in which domestic violence occurs while the woman is pregnant and during the first year of the infant's life

## Nature of the Problem

Domestic violence is a significant public health issue; 21-34% of women report being hit by an intimate partner in adulthood (Browne, 1993). Straus and Gelles (1986; 1990) reported that 16% of women were abused by their husbands during the past year, with an overall prevalence rate of 28%. Prevalence rates of violence in dating couples is estimated to be even

higher, ranging from 9-66% with an average of about 30% (Sugarman & Hotaling, 1989). Pregnancy is a high-risk time for domestic violence with rates reported in several studies of 15-20% of those women seeking prenatal care (Gazmararian et al., 1996; McFarlane & Parker, 1994; Peterson et al., 1997). Finally, children are at high risk to hear or witness this violence as they are disproportionately present (especially those under age 5) in households with domestic violence (Fantuzzo et al., 1997).

Rationale of Present Study

This study was the first to address, prospectively, the effects of domestic violence during pregnancy and the first year of life on infant well-being, including infant health, temperament, social development, and cognitive development. Maternal physical health, maternal mental health, and parenting behavior were proposed as factors mediating the relationship between domestic violence and infant outcomes. This study forms the basis of on-going research that will examine the intergenerational transmission of violence. Understanding what happens in violent families during this crucial period in child development could ultimately form the basis for informing policies regarding perpetrators.

## METHODS

Data collection occurred in three phases. The first (T1) occurred when the women were in their last trimester of pregnancy, the second (T2) when the baby was 2 months of age, and the third (T3) when the infant was about 1 year old. During T1 data collection, 207 participants were recruited from 53 sites throughout a tri-county area. The sample consisted of White/Caucasian (63%), Black/African American (25%), Latina (5%), Biracial (4%), Native American (1%), Asian American (1%), and other (1%) participants. The average age was 25 years. More details about the participants, as well as measures and procedures are described in

the larger report. We only note here the description of the tracking methodology, which was crucial for maintaining our high retention rate throughout this longitudinal project.

As part of developing this longitudinal project, intensive tracking procedures were developed and used to maintain contact with participants after the birth of their babies. Participants were contacted approximately one week after the due date to confirm each infant's date of birth, and then again 6-8 weeks after the infant's date of birth to conduct the T2 telephone interview. At the time of each telephone contact, the following tracking procedures were used: In the first week, if the participant could not be reached on the first telephone call, up to 10 telephone calls were made to the participant's home and 4 to her work telephone number. If the participant could not be reached by telephone, a letter was sent to her home. If, by the second week, participants had not been contacted by these methods (due to a disconnected phone, for example), the interviewer went to the participant's home. If the woman was not at home, a letter was left requesting that she contact the project office. During the third week, efforts were made to contact the women through several recontact people, whose names, addresses, and telephone numbers were provided by participants during their first interview. If these people could not be reached by telephone, the interviewer made two visits to their homes to talk to them; if they were not at home, letters were left requesting that they contact the project office. These procedures were used to follow the participants every 3 months between the T2 and T3 data collection. Participant retention was 98% at T2 and 92% at T3.

## MAJOR FINDINGS

We proposed to test a theoretical model that involved 11 latent constructs (see Figure 1). Data was cleaned by running frequencies in SPSS version 8.0; the frequencies were then examined (e.g., out-of-range values) for any mistakes in data entry. Any mistakes were then

corrected in the SPSS database. In order to estimate values for the longitudinal data analyses, missing data was imputed by matching participants on relevant variables. Using the program PRELIS, participants with missing data at T3 were matched with participants who were most similar to them based on T1 scores on the matching variables. PRELIS then produced a value for each of the missing data points, based on the matched participant's scale score for the variable in question. The estimated values were then entered into SPSS, and data analyses were running using the dataset with the estimated values.

Following data imputation, we examined measurement models for each construct. Only one of the 11 is a one-indicator latent construct. For this construct, there is no need to establish a measurement model. Of the remaining 10 latent constructs, two have two indicators, one has three indicators, and the others have four or more indicators. To establish the measurement models, we specified one-factor models for each of the constructs, and performed Confirmatory Factor Analyses (CFA). The one-indicator construct is the outcome variable that results from summing infant general health items at Time 3. The other 10 constructs are: Domestic Violence at Time 1 (2 indicators), Domestic Violence at Time 3 (4 indicators), Maternal Mental Health at Time 1 (4 indicators), Maternal Mental Health at Time 3 (4 indicators), Maternal Physical (prenatal) Health at Time 1 (5 indicators), Maternal Physical Health at Time 3 (4 indicators), Parenting at Time 3 (2 indicators), Temperament at Time 2 (3 indicators), Temperament at Time 3 (3 indicators), Infant Developmental Status at Time 3 (3 indicators), and Infant Social and Emotional Assessment (4 indicators).

To establish the measurement models, we specified CFA models so that all residual variances of factors and observed variables were estimated. Residual covariances were freed occasionally, in particular when this led to a significantly improved model fit. To obtain models

more parsimonious than the saturated model, occasionally parameters were set equal. Estimation was done using Generalized Least Squares; models were specified on the y-side; LISREL 8.5 was used for all models.

Three models did not lead to satisfactory solutions--Parenting at Time 3, Domestic Violence at Time 1, and Infant Developmental Status at Time 3. The statistical and descriptive measures used for model evaluation suggest poor fit. In the context of the larger models which we tested (see below), the indicators for these 3 constructs fared better and showed good fit to the construct. (This is often the case for constructs that only have two indicators.) Thus, we retained these constructs in the larger models.

Because of the complexity of the overall model and because of sample size constraints, we did not attempt to fit the entire model to the data. Rather, we fit submodels. At the time this report is written, the modeling phase is still in progress. We have specified a number of models. Although there are strong indicators that the hypothesized factor relationships can be established, none of the models has been finalized. We are discussing the selection of variables as indicators and the nature of the relations among factors. Because of the developing nature of the modeling phase, an example of one, small model is presented.

This model includes the factors of Domestic violence, Maternal Mental Health, and Physical Health, all assessed at Time 1. In its present form, the model suggests that Domestic Violence is indeed a predictor of both Maternal Mental and Physical Health, all at Time 1. The directed paths between these factors are significant. In addition, the model seems to suggest that all indicators load significantly on their factors, thus suggesting good internal validity. Thus far, only one residual covariance had to be freed. However, this model is not in its final form. The overall goodness of fit is not satisfactory. The $X^2(df = 41; n = 207) = 138.79$ is too large ($p <$

0.01), and the RMSEA = 0.13 is also too large. However, some of the goodness of fit indicators are strong, e.g., GFI = 0.99, so we assume that we are able to improve this model such that it can be retained. In a similar fashion, we are working on a number of other models that look as promising as this one.

In addition to the results for the models, in separate analyses, we examined the influence of domestic violence on pre- and postnatal maternal and infant health. Battered women reported significantly more prenatal health problems such as high blood pressure, infections, injuries, and sexually transmitted diseases. They also were significantly more likely to threaten to miscarry or to have premature labor (17.6%) and were more likely to need to stay in the hospital at birth due to health problems (29.4%) compared to women who had not experienced abuse during pregnancy (6.7% and 10.4%, respectively). Women who experienced DV entered prenatal care somewhat later than women who had not experienced DV, although this relationships was only a statistical trend. Finally, the DV group reported significantly more alcohol use, recreational drug use (during the first and second trimesters only), and cigarette use during their pregnancies compared to the no-violence group. Infants born to mothers who had experienced DV during pregnancy showed significantly more indicators of health problems during the first two months postpartum compared to infants born to women who had not experienced violence. More specifically, infants born to battered mothers were more likely to be hospitalized, more likely to have gone to the emergency room, and were taken to more outpatient doctor visits for reasons other than well-baby check-ups. In addition, the infants born to battered mothers weighed less at birth, although this was only a statistical trend.

In an additional set of analyses, we examined the impact of domestic violence on the attachment relationship to the unborn fetus. We found that domestic violence was not associated with a lower level

of engagement in maternal fetal attachment behaviors. We also found that adult romantic attachment style was a mediator between domestic violence and maternal-fetal attachment behavior for the women experiencing domestic violence with their current partner, but not for women experiencing domestic violence with a previous partner.

## IMPLICATIONS OF FINDINGS

- Our study found it difficult to recruit women who had never been battered in previous relationships. Although it was easy to find a non-battered during pregnancy sample, many of these women had experienced violence in previous relationships.

⇒ Our study supports national studies which find evidence that domestic violence is common and widespread. Women who are pregnant or parenting should not be held responsible for living with violent perpetrators. Living with a violent partner is, sadly, quite common.

- Our study found that, in our geographic area, and during the period of participant recruitment, almost no pregnant women sought services at domestic violence shelters.

⇒ Shelters may not provide a realistic refuge for pregnant women. Future research should investigate the reasons why these women do not use shelter services.

- Our study found evidence of the negative impact of domestic violence on pre- and postnatal maternal and infant physical and mental health.

⇒ This early, negative influence of domestic violence on infants suggests that courts might want to consider domestic violence a "superordinate" factor when evaluating child custody decisions. Infants experience negative physical health effects even in the early stages of life by being present in households with partner abuse.

⇒ Additionally, our findings may provide support for mandatory arrest laws in order to protect women (pregnant and parenting) and young infants from the significant negative impact of living with domestic violence.

- Our study found evidence that battered and nonbattered women do not differ in their maternal-fetal attachment behavior.

⇒ This suggests that although women experiencing domestic violence are under considerable stress, they feel emotionally close to their unborn child. Battered women are resilient and have the potential to be good parents.

- Our study found that for pregnant women in a current violent relationship, adult romantic attachment serves as a mediator for the effects of domestic violence on maternal-fetal attachment behavior. This relationship did not hold for women who had a past experience of domestic violence, but were not currently in a violent relationship.

⇒ The implications are positive for women who are able to leave battering relationships and establish new, nonviolent ones. Support should be given to women to leave batterers, especially during pregnancy. Financial resources should be made available to women and their children.

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## PROJECT DESCRIPTION

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### Rationale of Present Study

This study was the first to address, prospectively, the effects of domestic violence during pregnancy and the first year of life on infant well being, including infant health, temperament, social development, and cognitive development. Maternal physical health, maternal mental health, parenting behavior, and child abuse/neglect were proposed as factors mediating the relationship between domestic violence and infant outcomes. This study forms the basis of on-going research that will examine the intergenerational transmission of violence. Understanding what happens in violent families during this crucial period in child development could ultimately form the basis for informing criminal justice policy. While it is clearly important to understand the behavior of both victims and perpetrators, this study, due to limited resources, focused only on female victims and their infants.

## Specific Aims

- To examine the effects of domestic violence (pre and postnatal) on three infant outcomes: physical health, social development, and cognitive development.
- To examine 3 factors that may mediate the relationship between battering and infant outcomes: maternal physical health, maternal mental health, and parenting behavior.
- To examine the *mental health* effects of battering during pregnancy.
- To inform criminal justice policy regarding families in which domestic violence occurs while the woman is pregnant and during the first year of the infant's life.

## Nature of the Problem

Domestic violence is a significant public health issue; 21-34% of women report being hit by an intimate partner in adulthood (Browne, 1993). Straus and Gelles (1986; 1990) reported that 16% of women were abused by their husbands during the past year, with an overall prevalence rate of 28%. Prevalence rates of violence in dating couples are estimated to be even higher, ranging from 9-66% with an average of about 30% (Sugarman & Hotaling, 1989). Pregnancy is a high-risk time for domestic violence with rates reported in several studies of 15-20% of women seeking prenatal care (Gazmararian et al., 1996; McFarlane & Parker, 1994; Peterson et al., 1997). Finally, children are at high risk to hear or witness this violence as they are disproportionately present (especially those under age 5) in households with domestic violence (Fantuzzo et al., 1997). The current longitudinal study was the first to examine multiple indicators of infant functioning at age one in families with domestic violence.

## Effects of Domestic Violence (pre- and postnatal) on Infants

Despite the prevalence of domestic violence in homes with infants, only a handful of empirical studies have examined the impact of witnessing domestic violence on infants

and toddlers. Both the studies and clinical reports on this age group focus on physical health issues, rather than cognitive or social functioning. Layzer et al (1985) examined health and behavior problems in infants staying in domestic violence shelters. More than 50% of these infants showed weight and eating problems, sleep disturbances, and lacked normal responsiveness to adults. Clinical reports indicate that infants who witness domestic violence have poor health, poor sleeping habits, are highly irritable, and exhibit high rates of screaming and crying (Alessi & Hearn, 1984; Davidson, 1978). One possible explanation is that the chaotic, inconsistent environment created by domestic violence interferes with the normal development of self-regulation. Another possibility is that battered women and their abusive partners are less able to handle caring for an infant and that these deficits interfere with the development of self-regulation. Finally, in a small study of 12 children, ages four and under, preliminary evidence suggests that even young children may demonstrate posttraumatic stress disorder when exposed to severe family violence or other traumas (Scheeringa et al, 1995).

A few studies have examined the effects on infants of *nonviolent* conflict between their parents. Toddlers (age 12 to 36 months) with difficult temperament reacted more strongly and negatively to constructive marital disputes (Easterbrooks et al., 1994). Another study, examining infants ages 10 to 20 months, found that those exposed to more frequent interparental anger over a period of 9 months were more likely to become emotionally aroused by displaying anger, distress, or attempts to comfort or reconcile their angry parents compared with those infants exposed to infrequent parental anger (Cummings et al., 1981). It is likely that infants exposed to violent angry parental interactions may have similar or even heightened reactions.

Finally, from studies of normal infant development, it is clear that infants are able to detect and discriminate facial and vocal emotional expressions during the first six months of life (Walker-Andrews, 1997). During months six to twelve, infants develop the ability to recognize emotional expression and use significant others' facial and vocal expressions to judge situations (Walker-Andrews, 1997). Thus, even during the first year of life, infants are acutely aware of the anger and distress of their parents during domestic violence incidents. They may even be learning to respond violently in situations with intimate others, for example when feeling frustrated or angry. While actual intentional aggression is not seen until the toddler years, during infancy the child is beginning to learn about interpersonal relationships, including the use of violence and aggression.

**Infant Physical Health**

Prenatal battering is associated with low birth weight, chorioamnionitis, preterm labor, fetal distress, and fetal death (e.g., Berenson et al., 1995; Connolly et al., 1997; Dye et al., 1995; McFarlane et al., 1996a). Prenatal and infant health complications are associated with poor outcomes later in life. Low birth weight infants are more likely to experience deficits in physical growth, speech and language delays, central nervous system abnormalities, deficits in intelligence and school performance, and health status problems (Lefebvre et al., 1988; Tomchek & Lane, 1993). In addition, children with poor physical health are at increased risk for problems in psychosocial adjustment compared with healthy peers (Eiser, 1990; Wallender & Varni, 1998).

**Social Development**

Learning about violence may be influenced by the infant's attachment to the primary caregivers. Infant social and emotional development begins as a result of interactions with the primary caregivers. However, most extant studies have either collected data on only

school-age children or have combined school age and preschool children in the data analyses. The few studies that focused on preschool-age children revealed higher rates of behavior problems than in the older children (Davis & Carlson, 1987) and increased trauma and dissociative symptoms relative to older children (Rossman, 1998). The other studies focusing on this age group showed that these children had less empathy (Hinchey & Gavelek, 1982), lower levels of social functioning (Fantuzzo et al., 1991; Graham-Bermann & Levendosky, 1998b), lower levels of self-esteem, and higher levels of depression and anxiety relative to children in nonviolent families (Hughes, 1988; Hughes & Barad, 1983; Stagg et al., 1989). In a small observational study, Graham-Bermann and Levendosky (1998b) found that preschoolers who witnessed domestic violence (DV) had many more behavioral problems, exhibited significantly more negative affect, responded less appropriately to social situations, were more aggressive with peers, and had more ambivalent relationships with teachers than those from nonviolent families. Two studies with both preschool and school-aged participants demonstrated that the preschoolers were more severely affected by DV than were the older children (Hughes, 1988; Hughes & Barad, 1983).

One of the most important questions regarding children living in families with DV is whether early aggressive behavior or potential precursors to later aggression, particularly interpersonal violence, are present early in the children's lives. While no prospective studies of DV have addressed this issue over time, several longitudinal studies have examined early precursors to violence. These studies have found that aggression begins around preschool (ages 3-4) and shows a marked increase throughout childhood as well as a marked stability within children over time (Loeber et al., 1993;

Loeber et al., 1997). In addition, precursors to later aggression in adulthood that can be observed in infancy and preschool include difficult temperament, insecure-avoidant attachment, attention problems, impulsivity, low intelligence, and harsh parental discipline (see Loeber & Hay, 1997 for a review). Finally, some have argued that traumatic experiences may serve as causal factors for later aggression either by causing physiological changes that become addictive and result in acting out aggressive behavior (Hodge, 1992) or through internalization of the traumatic event leading to dissociation of affect and cognition (Haapasalo & Pokela, 1999).

**Cognitive Development**

Finally, low academic achievement is also associated with delinquency, aggression, and violent behavior in adolescence and adulthood (Moffitt, 1990; Patterson et al., 1989). The precursor to later academic achievement, infant cognitive development, is affected by the familial environment, with high risk environments associated with lower cognitive development in young children (Moore & Pepler, in press; Yeates et al., 1983). Extremely low scores on the Bayley Scales of Infant Development are associated with low intelligence in later childhood (Honzik, 1983; Kopp, 1994). Thus, in this study, we are interested in how domestic violence affects infant cognitive development, which may then, itself, serve as a risk factor for functioning later in life, including interpersonal violence.

**Summary**

These findings indicate that young children in violent families are learning to behave aggressively toward others and may act out as a way of coping with stress. As a result, witnessing violence as a child is a risk factor for continuing the cycle of violence in later relationships in life. This will be the first prospective study to examine the effect of witnessing violence on infant outcomes, including health, cognitive development, and social

development. Most importantly, this study will attempt to determine the variables that mediate these outcomes. Four mediating variables will be studied: maternal physical health, maternal mental health, parenting behavior, and child abuse/neglect. Each of these factors is considered in the sections that follow.

## Mediating Factors Between Domestic Violence and Infant Outcomes

### Maternal Physical Health

Women who are pregnant are at risk for being battered, possibly because pregnancy is an additional stressor for some families. About 20% of pregnant women seeking prenatal care are physically abused during their pregnancy (McFarlane & Parker, 1994; Peterson et al., 1997), 65% when verbal abuse is included (O'Campo et al., 1994). There is also evidence that violence increases over the course of pregnancy and causes significant physical problems (Bewley & Gibbs, 1991; McFarlane et al., 1996a; Stewart & Cecutti, 1993; Webster et al., 1994).

Because this problem is so prevalent and serious, it is surprising that researchers have only recently begun to pay attention to domestic violence during pregnancy and its impact on maternal and infant health. Studies have consistently demonstrated a number of negative health consequences for mothers and infants. For example, battered women experience significantly more birth complications during delivery (Valdez-Santiago & Sanin-Aguirre, 1996) and have a greater risk of delivering low birth weight babies (McFarlane et al., 1996a). They are also more likely to develop infections, anemia, and fail to gain weight during pregnancy (McFarlane et al., 1996a). Further, infants born to abused mothers are more likely to remain in the hospital after their mother's discharge (Dye et al., 1995). Unfortunately, no prospective, longitudinal studies have been conducted to determine the mediating effects of maternal health problems on infant/toddler health and development.

In addition to the direct consequences of domestic violence during pregnancy, maternal and infant health may be compromised by several other associated factors. One related risk factor is the lack of adequate prenatal care. McFarlane et al. (1996a) reported that battered women are twice as likely to wait to seek prenatal care during the third trimester, thus missing health care during crucial periods of fetal development. Second, several studies have found a significant relationship between prenatal violence and substance use during pregnancy (Grimstad et al., 1997; Martin et al., 1996). Martin et al. (1996) reported that abused women were significantly more likely to use multiple, harmful substances during pregnancy than were non-abused women. Similarly, Grimstad et al. (1997) found that battered women reported a higher consumption of alcohol and cigarettes during pregnancy than non-battered women. Another study reported that a combination of domestic violence, smoking, and alcohol/drug use led to serious problems, such as very low infant birth weight (McFarlane et al., 1996b).

Finally, domestic violence during pregnancy is strongly related to postpartum domestic violence. One study found that 95% of women battered during pregnancy were also battered within the first 3 months postpartum, with 52% requiring medical care for these postpartum injuries (Stewart, 1994). In addition, this study and another (Gielen et al., 1994) found a significant increase in abusive episodes in the postpartum period, compared to the prenatal period. This suggests an even greater risk of repeated battering when a new infant enters the family.

**Maternal Mental Health**

**Pregnancy**. Little is known about the effects of domestic violence during pregnancy on women's emotional health. However, in the few studies that have assessed the emotional health of pregnant, battered women have reported significantly higher levels of anxiety, depression, and emotional stress compared to non-battered women (Campbell et al., 1992; Stewart & Cecutti, 1993). One study reported that 53% of the battered pregnant women met criteria for a major depressive

disorder, and an additional 30% met criteria for another psychiatric disorder (Stewart, 1994). Interestingly, another study found that abused women believed they had little control over the health of their fetuses and believed that "chance" played the biggest role in the outcome of their pregnancy (Stewart & Cecutti, 1993).

It seems possible that the emotional sequelae of abuse is exacerbated during pregnancy due to the additional stress and worries associated with concerns about the fetus as well as concerns about ones' own well-being. The mother may fear that the baby is being harmed by the abuse, or she may worry that the child will suffer from the abuse after s/he is born. Severe emotional problems resulting from prenatal battering may also hinder a mother's ability to care for herself and her developing baby. In addition, research is just beginning to understand the impact of maternal emotional stress on fetal brain development (e.g., Lou et al., 1994; Weinstock, 1997). There is a need for research to examine the impact of prenatal domestic violence on mother's emotional health, and how that, in turn, impacts parenting and infant well being.

**Post-Pregnancy.** While little is known about the specific effects of battering on pregnant women's mental health, a number of studies have documented that nonpregnant battered women experience increased levels of depression, lower self-esteem, lower beliefs in self-efficacy, and higher levels of psychological distress when compared with non-battered women (Cascardi & O'Leary, 1992; Khan et al., 1993; Orava et al., 1996; Rounsaville & Lifton, 1983; Sato & Heiby, 1992; Testa, Miller, & Downs, 1993). Battered women are five times more likely to attempt suicide than other women (Stark & Flitcraft, 1996). In addition, the prevalence of post-traumatic stress disorder (PTSD) in battered women is high, ranging from 45% to 84% (Houskamp & Foy, 1991; Kemp et al., 1991; Kemp et al., 1995; Vitanza et al., 1995).

Parents, under a variety of stressful conditions (e.g., poverty, marital conflict, and divorce), as well as domestic violence, are more likely to be depressed, anxious, hostile, and withdrawn

(Hetherington et al., 1982; McLoyd, 1990). The psychological distress of parents in these high-risk environments negatively affects their abilities to parent (Pianta & Egeland, 1990). These parents often use harsher punishment, are less warm and nurturing with their children, and are generally less effective, and these children, in turn, are negatively affected (Conger et al., 1992; Conger et al., 1993; Elder et al., 1992; Hetherington, 1991; 1993; Lempers et al., 1989; Turturo, 1994). In addition, much research has documented the deleterious effects of parental depression on parenting and children's functioning (e.g., Beckwith, 1990; Rogosch et al., 1992; Rutter, 1990; Sameroff et al., 1982).

**Parenting**

A few studies have now examined the effects of domestic violence on parenting and its effects on children's adjustment (Holden & Ritchie, 1991; Holden et al., 1998; Levendosky & Graham-Bermann, 1998; McCloskey et al., 1996; Wolfe et al., 1985). Three studies found that maternal parenting stress was higher in domestic violence families than nonviolent families and that it was a significant predictor of school-age children's behavior problems (Holden & Ritchie, 1991; Levendosky & Graham-Bermann, 1998; Wolfe, et al., 1985). Although two distinct ways of defining maternal stress were used in these studies, all indicated that maternal stress was a mediator of the effects of domestic violence on children's behavior.

Some research has found differences in parenting behaviors with increased domestic violence. One study found that battered women were more physically aggressive with their 2-8 year old children compared with non-battered women as well as more inconsistent in their parenting style, becoming more or less strict and permissive based upon the presence or absence of their abusive partner (Holden et al., 1998). Two other studies found that parenting behaviors mediated the effects of domestic violence (Levendosky & Graham-Bermann, 1997; McCloskey et al.,1995) on school-age children's internalizing and externalizing behaviors. Finally, Graham-Bermann and Levendosky

(1998) found that non-battered mothers rated themselves as more effective parents than did battered mothers; however, this was unrelated to children's adjustment once witnessing domestic violence and maternal mental health were controlled.

All of the above studies examined the parenting of older children. Yet, parenting during infancy is critical for the formation of self-worth and later relationship functioning, as well as normative health and development (Clarke-Stewart, 1988; Maccoby & Martin, 1983; Youngblade & Belsky, 1995). In addition, parenting begins even before the child is born. Research indicates that mothers are emotionally involved with their fetuses early in the pregnancy (Müller, 1992), and that feelings of attachment increase as gestation approaches (Heidrich & Cranley, 1989). Preliminary research also indicates that there is moderate stability between parents' perceptions of their infants prenatally and during the first year of their infants' lives (e.g., Benoit et al., 1997; Fava-Vizziello et al., 1993; Zeanah et al., 1994).

**Infant Temperament: An Additional Influence on Parenting**

A number of studies have linked temperament to various psychosocial outcomes. For example, temperament has been related to attachment (Goldsmith & Alansky, 1987), behavioral inhibition (Kagan et al., 1993), shyness (Engfer, 1993), and sleep disturbances (Weissbluth, 1989). In the one study most directly related to the variables of interest in the present study, Sanson et al. (1993) found that infants with difficult temperaments were more likely to be hyperactive and aggressive later in life.

Researchers theorize that a complicated interplay between family and individual factors leads to later violent and aggressive criminal behavior (e.g., Farrington, 1986, 1987; Patterson et al., 1989). Henry et al. (1996) found that "the combination of lack of social regulation and lack of self-regulation [under controlling behavior] sets the stage for serious offending" (p. 622). Such interactions between temperament and family functioning have been reported for a number of child

behavior problems. Children with positive temperament traits seem less negatively affected by disorganized and disruptive families (e.g., Easterbrooks et al., 1994; Jansen et al., 1995; Kyrios & Prior, 1990). For example, Tschann et al. (1996) found, among 2-5 year olds, that temperament interacted with family environment: Children from high conflict families who also had "difficult" temperaments were more likely to have both internalizing and externalizing behavior problems compared to children with "easy" temperaments living in these same high conflict families.

Finally, a number of studies have demonstrated an impact of temperament on adjustment in older children, in particular, in interaction with parenting characteristics (e.g. Bates, Pettit, Dodge, & Ridge, 1998; Kochanska, 1995). In younger children, it appears that temperament may have a direct impact on parenting behaviors (Maccoby, 1992). Specifically, negative emotionality in the child has been associated with harsh parenting discipline (Clark, Kochanska & Ready, 2000). In this study, infant temperament is proposed to directly impact parenting behaviors and thus indirectly impact infant health and development.

## METHODS

Data collection occurred in three phases for this project. The first data collection (T1) occurred when the women were in their last trimester of pregnancy. The second (T2) occurred when the baby was 2 months of age. The third (T3) occurred when the infant was about 1 year old. Each of these phases will be described separately below.

## T1 Methods

### Participants

Participants were 207 pregnant women recruited from 52 sites, including obstetric/gynecological clinics, domestic violence shelters, health department agencies, and community centers as well as through flyers posted in laundromats, grocery stores, bus stops, and malls. Two types of flyers were used: one invited pregnant women to participate in a study about mother-infant relationships, and the other invited pregnant women who had experienced domestic violence to participate

Of the 207 participants, over half the women in the study identified themselves as White/Caucasian (63%), 25% were Black/African American, 5% Latina, 4% Biracial, 1% Native American, 1% Asian American, and 1% other. The average age was 25 years. Forty-five percent of the women had a high school diploma, equivalent, or some high school education; 35% had some college education; 7% had an Associate's Degree; 8% had a Bachelor's Degree, and 5% had a graduate degree. At the time of the interview, 42% were working outside of the home; the mean monthly income was $1,814 and the median monthly income was $1,500. Half of the women were single, never married, (50%); 40% were married, and 10% were separated, divorced, or widowed (See Table 1).

Of the battered women, the three most common types of violence reported on the Serious Violence Against Women Scale (SVAWS) (Marshall, 1992) were: "pushed or shoved you"(44%); "grabbed you suddenly or forcefully" (35%); "shook or roughly handled you"(33%). From the Conflict Tactics Scale (CTS) (Strauss, 1979), the three most common types of violence experienced were: "threw or smashed or hit or kicked something" (64%); "pushed, grabbed or shoved you" (47%); "hit or tried to hit you with something" (34%).

## Measures

See Table 2 for a list of measures administered at this time period. For purposes of organization, the theoretical and psychometric description of these measures will be presented later in the discussion section.

## Procedures

Women called the project office, where they were screened for eligibility. The women were told the study was about women's relationships with the important people in their life, including partners, family members, and children, and that if they participated in the study they would be asked about their thoughts and feeling about their relationships and recent life events, including domestic violence.

Women who were interested in participating in the study were told that they would be asked some questions about themselves and their relationships over the telephone in a five-minute interview. The screen was explained as an effort to ensure that the study included all different kinds of women from the community, so that if they answered the questions in a similar way to the women already enrolled in the study, they might not be eligible to participate. General inclusion criteria for all participants were: 1) 18 to 40 years of age, 2) involved in a romantic relationship for at least 6 weeks sometime during the pregnancy, and 3) available to be interviewed in the last trimester of pregnancy. Women were excluded from the study if it was believed they would have difficulty understanding questionnaires due to limited knowledge of the English language.

After approximately half the sample had been recruited and interviewed (N=96), it was found that only about a third of the participants had experienced domestic violence during pregnancy. In order to ensure equal numbers of battered and non-battered subjects, additional

screening procedures were utilized to recruit greater numbers of women who had experienced domestic violence. In addition to asking about age and relationship status, potential participants were administered the Conflict Tactics Scale (Straus, 1979) over the telephone. For the purpose of recruitment, women were categorized as "battered" if they had experienced physical violence during pregnancy according to this measure. The woman's battering status for the purpose of the study was determined by her answers on the Serious Violence Against Women Survey (SVAWS) during the in-person interview.

After 137 subjects had been recruited and interviewed, examination of their responses on the SVAWS indicated that many of the "non-battered" women in the control group (i.e., non-battered during pregnancy) had experienced battering with a previous partner at some previous time point. Because of concern that the control group differed in battering experience only as a function of time, efforts were made to recruit women who had never experienced domestic violence. Therefore, women who were categorized as "non-battered" by the telephone screen were then asked if they had ever experienced violence in any romantic relationship. After this screen was instituted, women were excluded if they had experienced violence in the past but were not battered during pregnancy, in order to ensure that the non-battered group would be more likely to include women who had never experienced domestic violence. Overall, 161 women who called the project office after screening measures were put into place were deemed ineligible because they did not meet age, relationship status, or battering experience criteria.

Ten undergraduate and five graduate research assistants were trained to administer the questionnaires. Before conducting interviews independently, undergraduate research assistants attended a weekly training meeting for one semester (15 weeks), and conducted 2-5 interviews under the supervision of project staff.

All trained interviewers reached a 95% inter-rater reliability on the questionnaire portion of the interview. This was determined by conducting a mock interview for all research assistants and having them fill out the questionnaires as they listened to the interview. Throughout the period of data collection, undergraduate research assistants continued to attend a weekly training meeting during which procedures were reviewed and difficulties that arose during interviews were discussed. In order to maintain reliability, each participant's questionnaires were reviewed by project staff to ensure they were filled out correctly.

The interviewers were trained to maintain a neutral, non-judgmental stance throughout the interview. Since a substantial proportion of the participants were from minority groups, training included issues of cultural sensitivity. Every effort was made to match interviewer-interviewer pairs on ethnicity. They were also trained to maintain confidentiality and handle difficult situations, such as the intrusion of partners or family members who were unhappy about the subject's participation in the study.

Interviews took place in the participant's home or in the offices of the project staff—determination of locale was chosen by the participant. The interviewer would begin by explaining the procedure, telling the woman that the interview was completely confidential, and obtaining her written consent to take part in the interview and for part of the interview to be audiotaped. Participants were also told that they could withdraw from the study at any time without any penalty or negative consequences. Each interview took about 3 hours to complete. The questionnaires were administered orally to control for any variation in the level of literacy among participants. Interviewers were blind to the battering status of the woman; this was ensured by administering the questionnaires on domestic violence at the end of the interview. Confidentiality was maintained by assigning all participants an identification number that was

placed on questionnaires rather than the participant's name. The participant list was kept separately from the data. At the end of the interview, participants identified 3 people in their lives (recontact persons) who would know how to locate the participant should she move. Form letters were signed by participants informing each recontact person about the project and their role in helping the project staff to locate the participant should she move. Project staff mailed these letters after the interview. Participants were paid $50.00 after the completion of the interview. All participants received a list of community resources available for women, including pregnancy-related services.

In any study such as this, there was substantial concern for the safety of the women. The following procedures were used in this regard. In order to ensure women's privacy and confidentiality, at the time of contact, women were asked if study personnel could contact them directly or if the women would rather have us reach them through a friend or family member. They were also asked to indicate any restrictions on how we might contact them, for example, if they would prefer that we not leave messages, only call during the day or the evening, or that we block caller ID when calling. If direct evidence of child abuse was uncovered, referrals to the appropriate local authorities were completed.

## T2 Methods

### Participants

Two hundred and three (203) women completed the T2 interview, which occurred 2 months postpartum. One of these 203 participants was unable to be contacted when her baby was 2 months old but was reached when her baby was one year old; she completed the Time 2 measures that were not time-dependent. Three women could not be located, and one had a stillbirth. Thus, the retention rate was 98%.

## Measures

See Table 2 for a list of measures administered at this time period.

## Procedures

Participants were contacted approximately one week after the due date to confirm each infant's date of birth, and then again 6-8 weeks after the infant's date of birth to conduct the telephone interview. During Week 6, if the participant could not be reached on the first telephone call, up to 10 telephone calls were made to the participant's home and 4 to her work telephone number. If the participant could not be reached by telephone, a letter was sent to her home. If, by Week 7, participants had not been contacted by these methods (due to a disconnected phone, for example), the interviewer went to the participant's home. If the woman was not at home, a letter was left requesting that she contact the project office. During Week 8, efforts were made to contact the women through several recontact people, whose names, addresses, and telephone numbers were provided by participants during their first interview. If these people could not be reached by telephone, the interviewer made two visits to their homes to talk to them; if they were not at home, letters were left requesting that they contact the project office.

A graduate research assistant made the initial follow-up telephone call to determine the baby's date of birth. Five undergraduate research assistants were trained to conduct the T2 telephone interview. Research assistants attended 3 training sessions in which they practiced the interview with each other, and then observed the trainer conducting an interview. Finally, they conducted a supervised interview with a participant: with the participant's permission, the interview was conducted on speakerphone. The trainer and interviewer marked participant responses independently. Reliability of 95% was obtained prior to allowing interviewers to

conduct T2 interviews independently. During data collection, interviewers attended weekly training meetings in which they discussed difficulties that came up during interviews and strategies to reach women who had moved and left no forwarding address.

Most of the T2 interviews were conducted by telephone (N=94). Women were contacted 6 weeks after the birth of their infants and were asked if they would be willing to participate in a 30-40 minute telephone interview. Information about confidentiality was read aloud to participants over the telephone before the interview began. The interviewer would then read the questions to the woman and write down her answers. In a small number of cases (N=9), this interview was conducted in person (e.g., when the participant did not have a telephone). Women were mailed (or given) a thank you card and a baby gift worth approximately $5.00 as a token of appreciation.

## T3 Methods

### Participants

One hundred-ninety (N=190) of the original participants and their infants were assessed for the third wave of data collection (a retention rate of 91.8%). Interviews were scheduled when infants were 12 months old (53.5% were conducted between the age of 11-12 months, 39% at 13-14 months, 5.4% at 15-16 months, and 2.1% at 17 months or older).

Data was not complete for some mother/infant pairs (5.8% of sample). Infant data was not obtained for 3 participants because they had lost custody of their children, 4 participants because they lived out of state, 1 participant could not bring her child to project offices, and 3 participants declined to have their children participate.

### Measures

See Table 2 for a list of measures administered at this time period.

## Procedures

Research assistants contacted mothers by telephone the month prior to the infant's first birthday in order to schedule the third interview as near as possible to that birthday. During this contact, participants were informed that portions of the 3-hour interview would be videotaped, and that they would receive $75 and a gift for their infant as payment for participating. A letter confirming the appointment was sent to participants, which also explained that some of the tasks involved a separation between the mother and the infant. A packet of several questionnaires was sent to the mother to complete ahead of time and bring to the interview.

The following tracking procedures for the study were used: In the first week of the month prior to the child's first birthday, 10 telephone calls were made to the participant's home and 4 to her work telephone number. If, by the second week, research staff had not contacted participants (due to a disconnected phone, for example), interviewers went to her home. If the woman was not at home, a letter was left requesting that she contact the project office. In the third week, efforts were made to contact the women through several recontact people, whose names, addresses, and telephone numbers were provided by participants during their first interview. If the recontact people could not be reached by telephone, interviewers made two visits to their homes to talk to them; if they were not at home, letters were left requesting that they contact the project office. If after one month the above procedures failed or if it was known that the participant had received our letters and phone messages and was not returning our calls, letters were sent and calls made to participant and recontact people every other week for 1 month and then 1 time per month after that.

Seven undergraduate and three graduate research assistants administered the mother interviews, and six undergraduate and one graduate research assistant performed the infant assessment. Training for both teams (mother interviewers and infant assessors) consisted of twenty-seven 2-hour class meetings over a 7-month period. An additional eight hours per week during this period were spent in training on project materials. Class meetings included a discussion of a course pack of 21 research articles in the areas of infant development, child assessment, attachment theory, and partner relationships.

Infant assessors were trained to administer the Bayley Scales of Infant Development–II (BSID-II; Bayley, 1993). This team spent eight weeks studying a manual and training videos in preparation to administer the BSID-II. Assessors then videotaped 2 practice sessions with a partner, which were rated for reliability by another team member with a checklist of BSID-II procedures. Infant interviewers were then rated for reliability on videotaped sessions of the BSID-II with three non-participant infants. All interviewers were able to reach or surpass the standard of 85% reliability with the checklist. Undergraduate assistants shadowed one actual interview conducted by graduate assistants before administering the protocols independently. Every fifth BSID-II conducted by each interviewer was rated for reliability throughout the collection of the T3 data. Each infant assessor was provided feedback about her performance so that a reliability of 85% was maintained throughout this phase of data collection.

Mother interviewers were trained to administer the questionnaire packet. This team was trained to conduct the interview in a neutral, non-biasing manner. Interviewers administering the questionnaires were observed and given oral and written feedback about their performance. All trained interviewers reached a 95% inter-rater reliability on the questionnaire portion of the interview. This was determined by conducting a mock interview for all research assistants and

having them fill out the questionnaires as they listened to the interview. Throughout the period of data collection, undergraduate research assistants continued to attend a weekly training meeting during which procedures were reviewed and difficulties that arose during interviews were discussed. In order to maintain reliability, each participant's questionnaires were reviewed by project staff to ensure they were filled out correctly. Feedback was given to each interviewer throughout the period of data collection so that high reliability was maintained.

Mothers and infants were interviewed concurrently in most cases during a 3-hour interview at the project's offices. Mothers and their infants first entered an interview room with the mother interviewer, who explained confidentiality and administered a consent form and demographic questionnaire. Infant assessors administered and videotaped the BSID-II. During this infant task, mother interviewers administered questionnaires. In cases of difficult separations, the BSID-II was conducted with the mother present, and the questionnaires were completed with the child and mother together in the room. One participant completed the entire mother interview by telephone, and 4 completed them by mail, due to out of state residency.

Upon completion of the protocol, mothers were paid $75 and presented with a book (worth about $5) for their infant.

## RESULTS

### Model Testing

Model testing necessitated three steps. The first step involved cleaning, as well as estimating and imputing missing data. The second step involved establishing the measurement characteristics of the constructs used in the third step--modeling. Our attempts to provide structural models that explain the predictive and correlational relationships between the latent variables were guided by the general model depicted in Figure 1. This model indicates predicted

relationships between T1 and T3 variables. In general, it predicts that parenting (measured at T3) mediates the relationship between three domains measured at T1 and T3 (domestic violence, maternal mental health, maternal physical health) and infant outcomes (measured at T3). All constructs measured at T1 are believed to influence the same construct at T3. In addition, infant temperament is believed to directly influence parenting.

**Step 1: Cleaning and Imputation**

Data were cleaned by examining the frequencies of all responses (SPSS version 8.0); the frequencies were then examined (e.g., out-of-range values) for any mistakes in data entry. Any mistakes were corrected. Data was missing from Time 2 data and Time 3 data for reasons explained in the methods section: women were missing at the time of data collection, women lived out of state, and/or women had lost custody of their children. In addition, at Time 3, one baby had a broken leg, and so the motor section of the BSID-II was not administered. Overall, missing data occurred less than 1% of the time.

In order to estimate values for the missing data for the longitudinal data analyses, subjects were matched on the following variables: income at Time 1, T1 total violence score from the SVAWS, T1 total violence score from the Conflict Tactics Scale (CTS) (Strauss, 1979), T1 total depression score from the BDI, T1 total anxiety score from the BSI, T1 total self-esteem score from the RSEQ, T1 total score from the Saunders PTSD Scale for Battered Women, and T1 sum of total physical health problems. Participants with missing data at T3 were matched with participants who were most similar to them based on T1 scores on the matching variables described above. A value for each of the missing data points was then estimated (using the program PRELIS), based on the matched participant's scale score for the variable in question. It should be remembered that this procedure was employed less than 1% of the time.

**Step 2: Establishing Measurement Characteristics of the Constructs**

At the time this report is written, the modeling phase is still in progress. We have specified a number of models. Because the research was based on an a priori theoretical model, confirmatory data reduction (LISREL 8.5) procedures were used throughout. Although there are strong indicators that the hypothesized factor relationships can be established, none of the models has been finalized. We are in the process of determining the appropriateness of the selection of measures and the nature of the relationships among factors. Because of the developing nature of the modeling phase, we only report the current status of one of the models here.

This model includes the factors of Domestic Violence, Maternal Mental Health, and Physical Health, all assessed at Time 1. Figure 3 depicts this model as it turned out in a first, preliminary analysis. In its present form, the model suggests that Domestic Violence is correlates with both Maternal Mental and Physical Health. In addition, the model seems to suggest that all measures are related to the grouping of variables one would expect.

However, these analyses have not been finalized. The statistical indicators of overall goodness of fit are not satisfactory. However, some of the statistical indicators are strong. As a result, with further analyses it may be possible to improve this model such that it can be retained. In a similar fashion, we are working on a number of other models that look as promising as this one.

Our work on specifying and analyzing theoretical models is also on going. However, in the interim, several other sets of data analyses have been conducted. One has led to a paper currently in press (Huth-Bocks, Levendosky, & Bogat, in press); the other was a student master's

thesis that is being prepared for publication (Weatherill, Levendosky, & Bogat, 2000). This work is reported below.

## Other Data Analyses

### The Impact of Domestic Violence on Maternal Mental and Physical Health During Pregnancy

We compared women who experienced violence during pregnancy with those who did not. (Results that follow are from Huth-Bocks, Levendosky, & Bogat, in press.) Battered women reported significantly more prenatal health problems (e.g., high blood pressure) that may have led to more threats of miscarriage and more premature labors. Compared to non-battered women, they stayed longer in the hospital after the birth because of health problems. There was a statistical trend for battered women to enter prenatal care at a later point than non-battered women. Finally, battered women reported significantly more alcohol and cigarette use (during all trimesters) and recreational drug use (during the first and second trimesters only). The two groups did not significantly differ on the number of prenatal visits, the number of weeks pregnant at delivery, and marijuana use during all three trimesters.

Because the two groups differed significantly in monthly income (the battered women had lower incomes), the above analyses were reconducted using income as a covariate. These analyses indicated that the group difference for prenatal health problems was reduced to a statistical trend ($p < .10$), while the difference in the month entering prenatal care became non-significant. Significant group differences remained for: threats of preterm labor/miscarriage, maternal stay at hospital at birth, and maternal use of alcohol, cigarettes, and recreational drugs.

**Infant Outcomes**

The Huth-Bocks et al. (in press) study also examined the influence of domestic violence on infant health at two-months postpartum. Infants born to battered women showed significantly more health problems; they were more likely to be hospitalized, to have gone to the emergency room, and to have seen their pediatricians more often for visits other than well-baby checkups. There was a statistical trend for these infants to have lower birth weights. However, there were no differences between the groups on total infant health problems (e.g., colic) or birth complications. After income was co-varied (see above), the group difference for infant hospitalizations became a statistical trend ($p < .10$); the difference for infant birth weight became non-significant. Significant group differences remained for number of infant doctor visits and infant ER visits.

We also tested whether substance use and maternal depression were mediators between violence and maternal and infant outcomes (cf. Baron & Kenny; 1986). Contrary to expectations, substance use did not mediate the relationship between DV and any of the health outcomes for mothers and infants. Also unexpectedly, maternal depression only partially mediated the relationship between DV and one health outcome: prenatal health problems. Domestic violence was significantly related to maternal depression ($\beta = .39$, $p < .001$) and prenatal health problems ($\beta = .16$, $p < .05$). Maternal depression was also related to prenatal health problems ($\beta = .13$, $p < .10$), although this was only a statistical trend. Finally, once depression was entered into the model, the relationship between DV and prenatal health problems became non-significant.

**The Effects of Domestic Violence on Attachment**

The second study from this data set (Weatherill et al., 2000) tested hypotheses about the effects of domestic violence on attachment styles and the relationship between romantic and maternal attachment using T1 data. Based on scores on the SVAWS, two groups of women were selected: those who had been battered by a previous partner but not by their current one (n=45) and those who had been battered by their current partner (n=61). The two groups differed only on income and marital status (women being battered by their current partners had lower monthly incomes and were more likely to be single, never married). Other measures used in this study included the Maternal-Fetal Attachment Scale (Cranly, 1981), the Dyadic Adjustment Scale (Spanier, 1976), and the Attachment Style Questionnaire (Feeney, Noller, & Hanrahan, 1994).

There were three predictions. The first was that domestic violence would be associated with a lower level of engagement in maternal fetal attachment behaviors. A t-test showed no differences between the two groups. The second was that adult romantic attachment style would serve as a mediator between domestic violence and maternal-fetal attachment behavior. This prediction was partially supported. Path models were tested separately for each group. The model fit for the women experiencing domestic violence with their current partner was $X^2(1, N=61) = .37$, $p > .05$, GFI = 1.00. The path coefficient for the effects of domestic violence on adult romantic attachment style was significant ($\beta = -.25$, $p = 0.05$, one-tailed), and the path coefficient between adult romantic attachment style and maternal-fetal attachment behavior was also significant ($\beta = .44$, $p = .001$, one-tailed). When the indirect effect of domestic violence on maternal-fetal attachment behavior was tested, the path coefficient was insignificant ($\beta = -.07$), and the model was saturated so that it did not yield statistics on the fit of the data. The model fit for women experiencing domestic violence with a previous partner was $X^2 (1, N=45) = .79$, $p >$

.05, GFI .99). The path coefficients were non-significant but the overall fit of the model was good, suggesting that for this group adult romantic attachment does not serve as a mediator between domestic violence and maternal-fetal attachment behavior. The indirect correlation for severity of DV on maternal-fetal attachment behavior was .032. As with the previous analysis, when the indirect effect of domestic violence on maternal-fetal attachment behavior was tested, the path coefficient was insignificant ($\beta = .13$), and the model was saturated so that it did not yield statistics on the fit of the data.

The final prediction was that high relationship satisfaction would modify the effects of domestic violence on adult romantic attachment only for women who were not currently experiencing domestic violence. This was tested with two separate hierarchical regressions. Relationship satisfaction, severity of battering, and the interaction of these terms were entered as predictors and adult attachment style as the outcome. In neither regression was the interaction term significant.

## DISCUSSION

This was an ambitious study to conduct in a two-year period. We were successful in meeting most of our goals. The Discussion Section is composed of two sections: methodology and data.

### Methodology

We were able to recruit 207 women, approximately half of whom were battered and half of whom were not. We experienced significant difficulties in recruiting our sample. It proved quite easy to find pregnant women, but difficult to find pregnant, battered women. It was surprising that in our geographic area, these women were not seeking the services of shelters nor making contact with lawyers.

We note throughout the Methods Section significant changes in our recruitment strategy that enabled us to collect data from 207 participants. Most significantly, we extended data collection for an additional 6 months. Although such a decision will have excellent long-term benefits for the longitudinal study as a whole, data coding and data analyses were substantially delayed as a result of this decision.

By their nature, longitudinal studies have many challenges. Two of the PIs had previous experience with collecting longitudinal data from high-risk populations. Unfortunately, the budget did not include sufficient funds to hire an individual to focus on tracking during the two years of our grant. Our sample is composed of mainly low-income women who move frequently, but those women in our study who are both battered and low income move even more often. It is typical for these women to move several times during the course of three months. Each participant nominated three people at every interview who would be able to locate the participant (we labeled these people, recontact people). Unfortunately, low-income women also have family and friends who are low-income and move frequently. We spent considerable time tracking the recontact people when we could not locate the participant. Regardless, we maintained a high retention rate throughout the two years. Current funding from CDC supports continuing to track our participants and their children through the child's fourth birthday includes financial incentives for participants to contact us every 3 months. This has made a substantial difference in reducing the amount of time we spend tracking individuals and our retention rate.

We had difficulty recruiting participants (battered and non-battered) in the early months of our study. The financial incentive ($15) was simply insufficient for most women. We were able to secure additional funds through our university and increased participant payment to $50.

This helped Data collection—needed to find funds to increase the amount of payment for subjects; also difficulty with cancellations and scheduling; women with low income had difficulty coming to the university for T3 data collection—we needed to do videotaping of the mother-infant interaction. For T1, we went to their homes, but problems with abusive partners being there that we had to work around. We also learned about the length of time of the interview that was tolerable for women and infants—this was particularly true at T3 where participants engaged in a 3-hour interview.

One additional methodological point is worth noting. It is very difficult to find measures of infant outcomes, other than those that involve tremendous staff labor for administration (e.g., BSID-II) or coding (e.g., mother/infant videotaped interactions). In addition, parenting questionnaires typically assess skills parenting toddlers and older children. There were no standard measures for assessing child abuse and neglect with one year olds. We had hoped to obtain protective service reports from our participants; however, the new director would not give us permission to do so.

In summary, we are pleased with our ability to recruit and retain participants in our study, especially in the context of a shortage of resources during the two years of the grant. We are fortunate to have received additional funding from CDC to continue the work that we began with the NIJ grant. In that grant, we were able to request additional funds for staffing and participant payment that make participant retention and data collection somewhat easier.

**Data**

In our grant, we proposed data collection and data coding procedures that were quite labor intensive. We had previously noted that recruitment took an additional 6 months. Data coding also took longer than anticipated. It has proven difficult getting coders reliable on

maternal interviews and maternal/infant interaction measures. This data coding is on-going and the data is not available to analyze at this time.

Analyzing the theoretical model for our study has also proven time intensive involving inputting and cleaning data, imputing data for longitudinal analyses, and specifying measurement models. Some of the difficulties in fitting the models come from problems with key variables (parenting and infant outcomes), which lack variance. As stated above, there is a paucity of questionnaires for these two outcomes. We hope that later analyses, using behavioral observations, may help with model fit. In addition, the major construct in this study, domestic violence, has significant measurement problems. The measures (SVAWS and CTS) have variance, but only in the half of the sample who is battered. Preliminary model fitting involved putting both battered and non-battered women into the analyses. We are considering other avenues of analysis, including running separate models for battered and non-battered women as well as possible categorical analyses. We also plan to develop other theoretical models to test.

However, although no theoretical models proposed have been fully investigated at this point, several other, smaller data analyses were conducted. Both demonstrate that in a sample of pregnant women experiencing domestic violence, there are negative consequences for women's physical and mental health. In the first study (Huth-Bocks et al., in press), we demonstrated that DV during pregnancy has significant negative health effects for both mothers and infants that begin during pregnancy and last at least through the first several months after birth. These included: later entrance into prenatal care, more prenatal health problems, greater likelihood of threats to miscarry, lower infant birth weight, and greater likelihood of staying at the hospital due to health problems for mothers. Furthermore, battered women used significantly more chemical substances during pregnancy and more health care services for their infants after birth than non-

battered women. Future research we plan to conduct will examine various mediators of these negative health effects. It is possible that some of them (e.g., premature labor) could be due to direct physical attacks and injuries that women sustained during pregnancy. Examining possible mediating factors, we found that maternal chemical substance use and maternal depression during pregnancy did not mediate the relationship between domestic violence and health outcomes. Only one model approached significance (statistical trend only) whereby depression mediated the effects of violence on prenatal health problems. It may be that factors we did not examine in this study, such as stress, may be the mechanisms through which domestic violence exerts its effect on maternal and infant physical health (cf. Cokkinides & Coker, 1998; Curry & Harvey, 1998; Dye et al., 1995; Petersen et al., 1997).

Contrary to expectations and to previous studies, women who experienced violence were not significantly different from women who had not experienced violence on a number of outcomes such as amount of prenatal care, gestational age, and total birth complications. Because a substantial number of participants were recruited through agencies serving pregnant women, it is likely that most of our participants were receiving prenatal care. Our sample may not have been representative of the experiences of more severely battered women who are more socially isolated (McFarlane et al., 1996).

The results of the study regarding infant health in the first two months of life were inconsistent. Infants born to women abused during their pregnancy did not have more health problems after birth, but these women reported using more health care services for their infants. Two possibilities may explain the findings. First, battered women may have used health services more than non-battered women for reasons other than infant health problems (e.g., fear for

infants' health and safety, help-seeking behavior). Second, it may be that infants of battered women do, in fact, have more health problems, but these were not measured in our study.

In the second study, (Weatherill, Levendosky, & Bogat, unpublished manuscript), we found limited support for the theory that internal working models in adults are consistent within the individual across relationships. We found no difference in the level of engagement in maternal-fetal attachment behaviors between the group of women who had experienced domestic violence with a current partner during pregnancy and the women who had experienced domestic violence with a previous partner. There are several possible explanations for this finding. When women experience domestic violence during pregnancy, they may nonetheless keep warm feelings for their unborn children and feel optimistic about their futures. It may be that only after the child's birth do these feelings dissipate. For example, studies of parenting with older children have found that domestic violence negatively affects maternal expression of warmth (Levendosky & Graham-Bermann, 2000). Alternatively, the lack of difference between the two groups may reflect commonalities between them. Both groups of women shared a history of domestic violence. Perhaps this history was more salient and influential than differences in degree of severity of domestic violence or whether it occurred with the current partner or a previous one.

In addition, we found that for women who had experienced violence during pregnancy, adult romantic attachment mediated the relationship between domestic violence and maternal-fetal attachment behaviors. Perhaps violence with an ex-partner may have less impact than current violence on a woman's psychological functioning, and by extension, on her parenting (cf. Levendosky & Graham-Bermann, 2001). Adult romantic attachment may not mediate the relationship between past experiences of domestic violence because the current non-violent

relationship has more effect on the woman's adult romantic attachment style than past experiences of violence. This would be consistent with the findings of a study on marital relationships and parenting that indicated that the parents' relationship at the time of the birth of their child was more predictive of their parenting style than their relationship style prior to the birth (Lindahl, Clements, & Markman, 1997).

The idea that a woman's romantic attachment style may reflect the influence of a current positive relationship over the influence of past experiences of violence suggests resilience in adult attachment style. In the context of a new, non-violent relationship the woman may rework her internal working models. This is consistent with a recent longitudinal study on adult romantic attachment, which found that attachment style was related to relationship status and changed from insecure to secure after the beginning of a new relationship (Davila et al., 1997).

These findings provide another way of understanding the implications of domestic violence on children. In order to protect children from the damaging effects of domestic violence, it is necessary to protect women from these effects even before the child is born. Interventions aimed at preserving the mother-child relationship should consider the mother's adult attachment style and environmental factors that may protect or harm it. The results of this study suggest that violent romantic relationships are a factor in both adult romantic and maternal-fetal attachment. However, the results from the control group of women who experienced violence with a previous partner indicate that the impact of domestic violence on attachment style may be diminished when the woman leaves that relationship and enters a non-violent romantic relationship. This suggests some resilience in adult attachment style and offers a hopeful note for interventions aimed at helping women recover from domestic violence.

As with the harmful effects of domestic violence, the results of this study suggest that the effects of attachment problems on the mother-child relationship may begin before the child is born, as the maternal attachment is influenced by adult romantic attachment style. If adult romantic attachment were responsive to changes in the environment, specifically changes in relationship status, this would be an important area in which to intervene to prevent future mother-child attachment difficulties.

**Implications for Criminal Justice**

Our findings indicate that women and infants' health is negatively affected by domestic violence. This suggests the need to remove perpetrators from the home, even during the woman's pregnancy and in the early months of the child's life. Not all states currently weigh domestic violence as an overriding factor in child custody decisions (Cahn, 1991). In addition, the criminal justice community has engaged in a spirited debate about the benefits of mandatory arrest for perpetrators (e.g., Buzawa & Buzawa, 1993). The findings are equivocal, but this research has not examined the effects of domestic violence on the child and the child's right to live in a nonviolent home.

Historically, the justice system has treated IPV as a family matter, and often an inconsequential one. When IPV is considered relevant, the focus often shifts from the rights of children to live in nonviolent homes to issues of paternal rights (Pagelow, 1992). In 1990, Congress voted unanimously that every state should enact laws providing that credible evidence of IPV create a refutable presumption against custody for the batterer [H.R. Con. Res. 172, 101st Cong., 2d Sess (1990)]. By 1995, the District of Columbia and 38 states had made IPV a relevant factor in child custody decisions [National Center on Women and Family Law, State Custody Laws with Respect to Domestic Violence (1994)]. Currently, a few states either create

a refutable presumption that custody not be granted to a parent with a demonstrated history of domestic violence, or mandate that it is not in the best interests of a child to be in the custody of someone who has committed IPV, but this is *not* the law in all states, including Michigan (Cahn, 1991). Results of this study provide initial, compelling evidence that the effects of domestic violence occur early in the lives of children, and thus might have relevance for considering domestic violence a "superordinate" factor when evaluating child custody.

In addition, since the Sherman and Berk (1984) study of a mandatory arrest policy for domestic violence in Minneapolis, the criminal justice community, the battered women's movement, and the academic research community have all argued about its effectiveness and necessity. A recent review concludes that the available data is incomplete and insufficient to make firm conclusions about the effects of mandatory arrest on deterrence of future IPV (Garner et al., 1995). Some researchers, in response to the lack of convincing evidence, now argue for the elimination of mandatory arrest programs (Buzawa & Buzawa, 1993; Gelles, 1993; Schmidt & Sherman, 1993). These researchers have suggested alternatives, such as victim preference (Buzawa & Austin, 1993), discretion of the police officer (Schmidt & Sherman, 1993), or community intervention projects that focus on treatment (Gelles, 1993). However, others have argued that mandatory arrest is not simply about deterrence, but also serves a positive social function in that it "represents a progressive redistribution of justice on behalf of women" (Stark, 1993, pg. 677). This research and debate has neglected the effects of violence on children and their rights to live in a nonviolent home; the results of this study may help inform this debate.

## SUMMMARY CONCLUSIONS

Overall, the findings suggest the following:

1. There are substantial and predictable consequences for pregnant women experiencing violence and their infants. These consequences appear to affect both their physical and mental health. Specifically, victims of violence during pregnancy experience: later entrance into prenatal care, more prenatal health problems, greater likelihood of threats to miscarry, lower infant birth weight, greater likelihood of staying at the hospital due to health problems for mothers, use significantly more chemical substances during pregnancy and use more health care services for their infants after birth than non-battered women.
2. Only depression was detected as possibly mediating the effects of violence on prenatal health problems.
3. However, women who were victims of violence did not appear to experience differential amounts of prenatal care, deliver prematurely, or have more birth complications.
4. Infants born to women abused during their pregnancy did not have more health problems after birth, but these women reported using more health care services for their infants.

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Figure 1: Theroetical Model

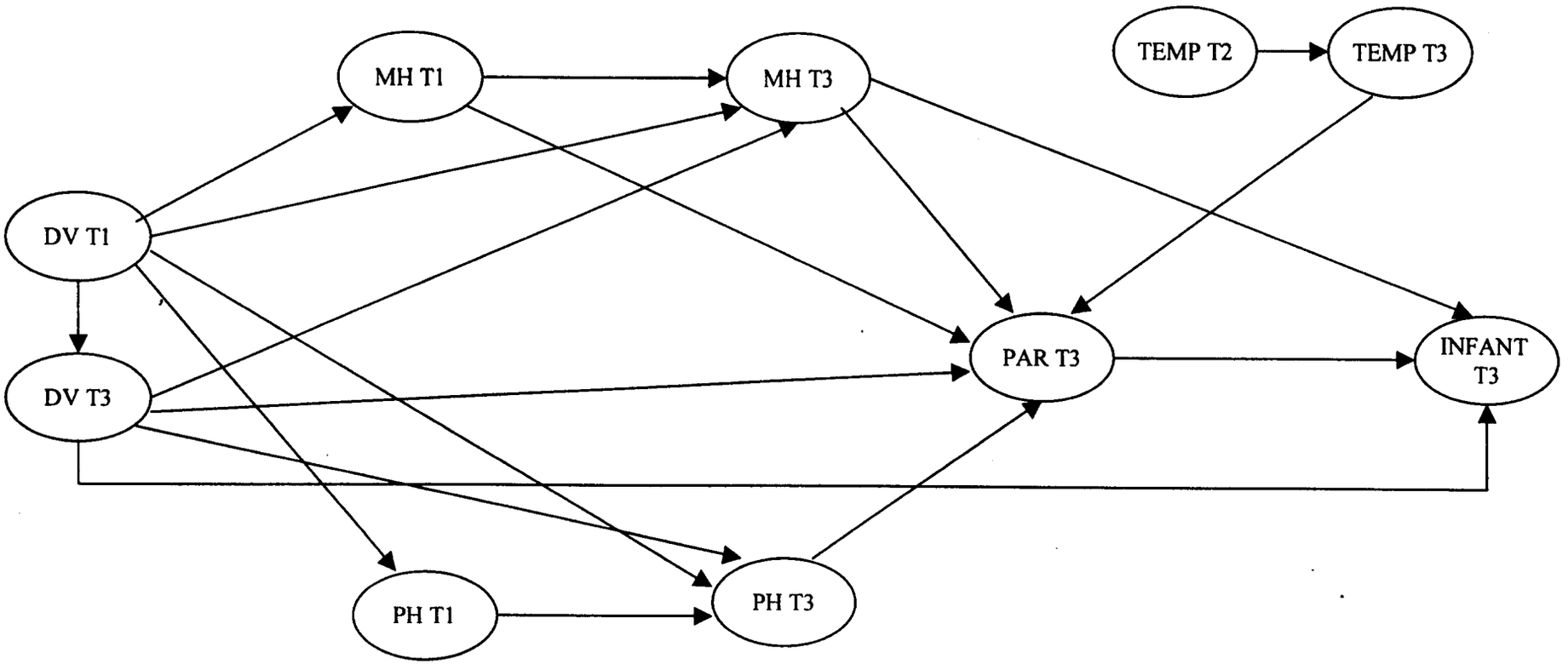

Figure 2: All Measurement Models

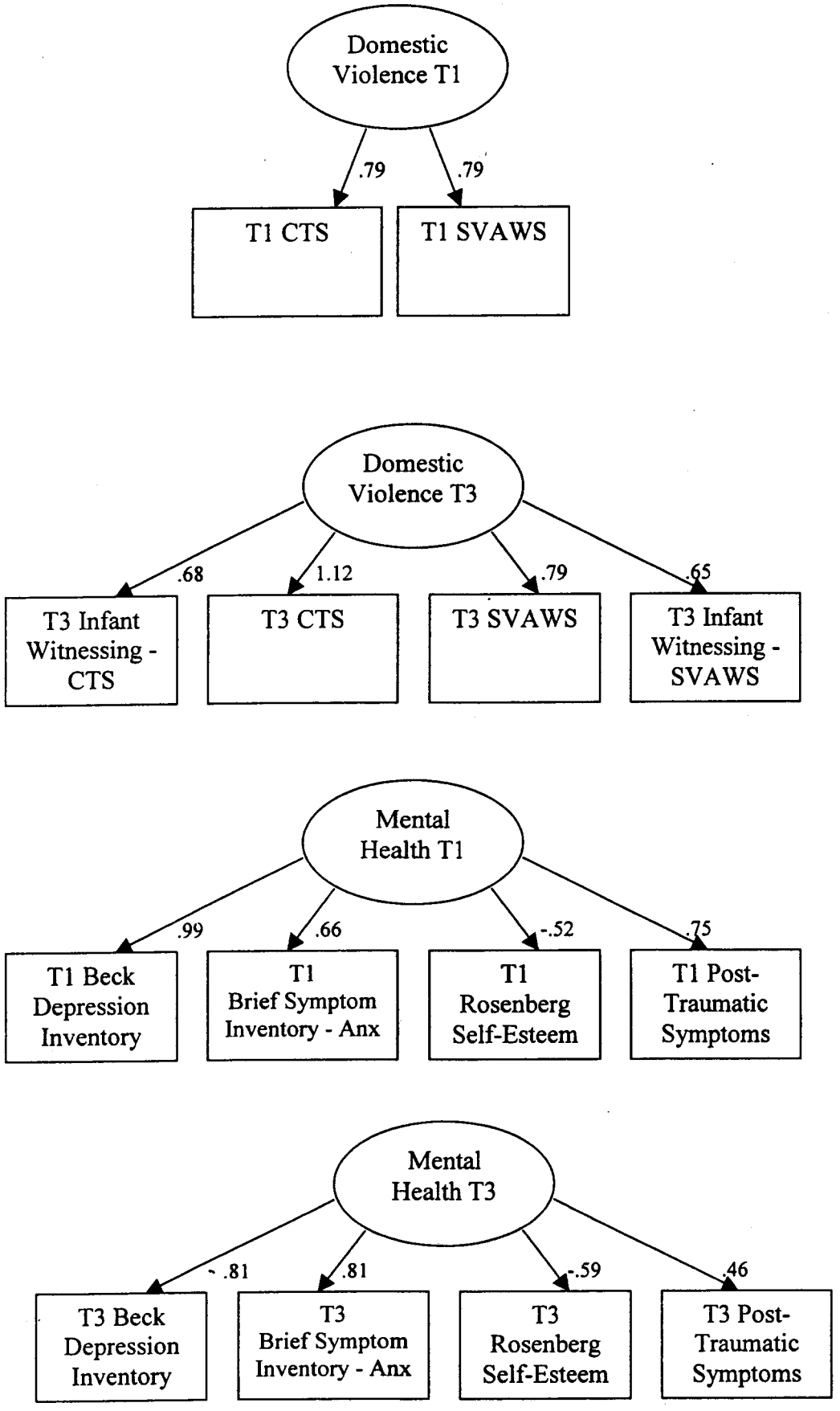

Figure 2: All Measurement Models

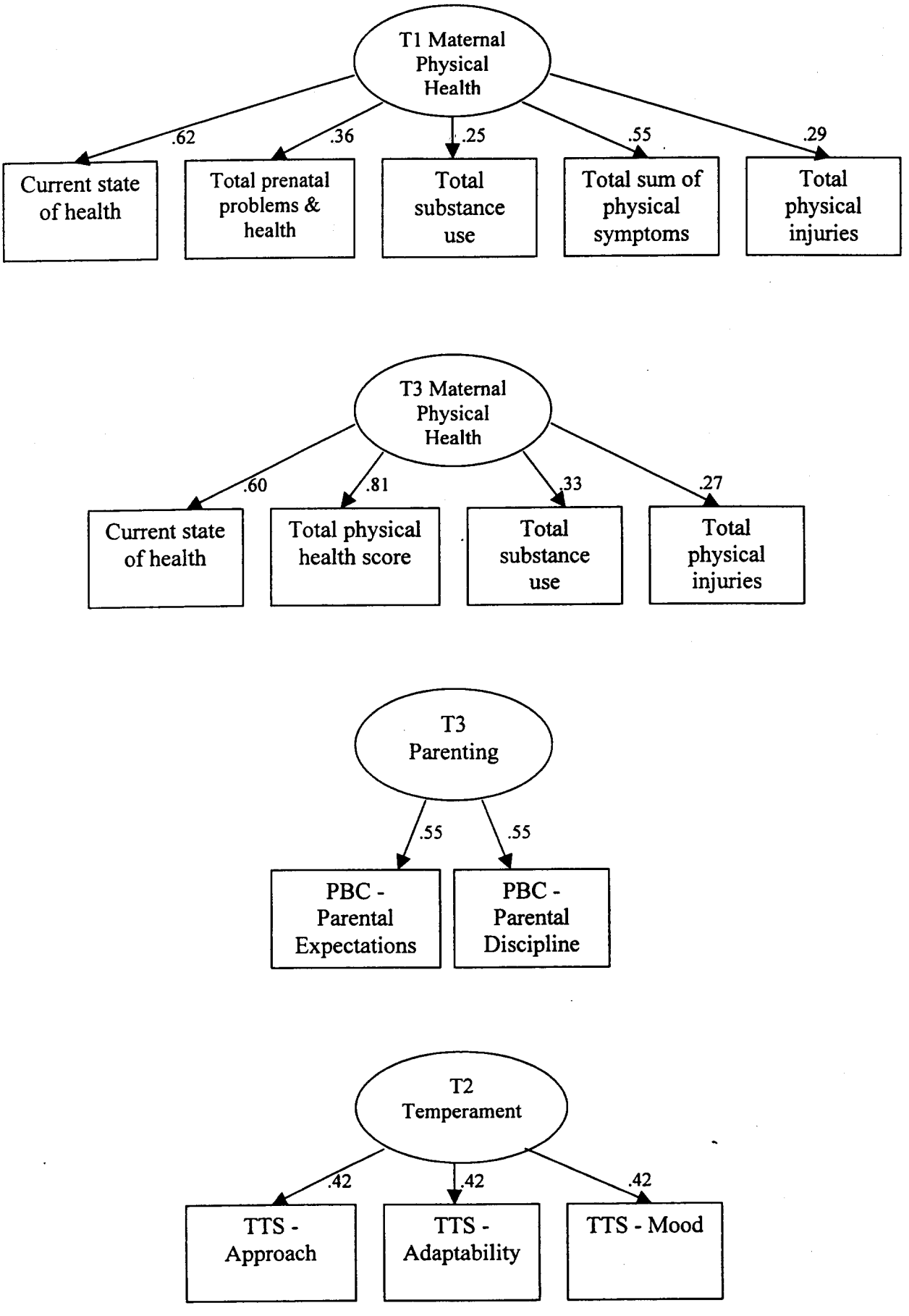

Figure 2: All Measurement Models

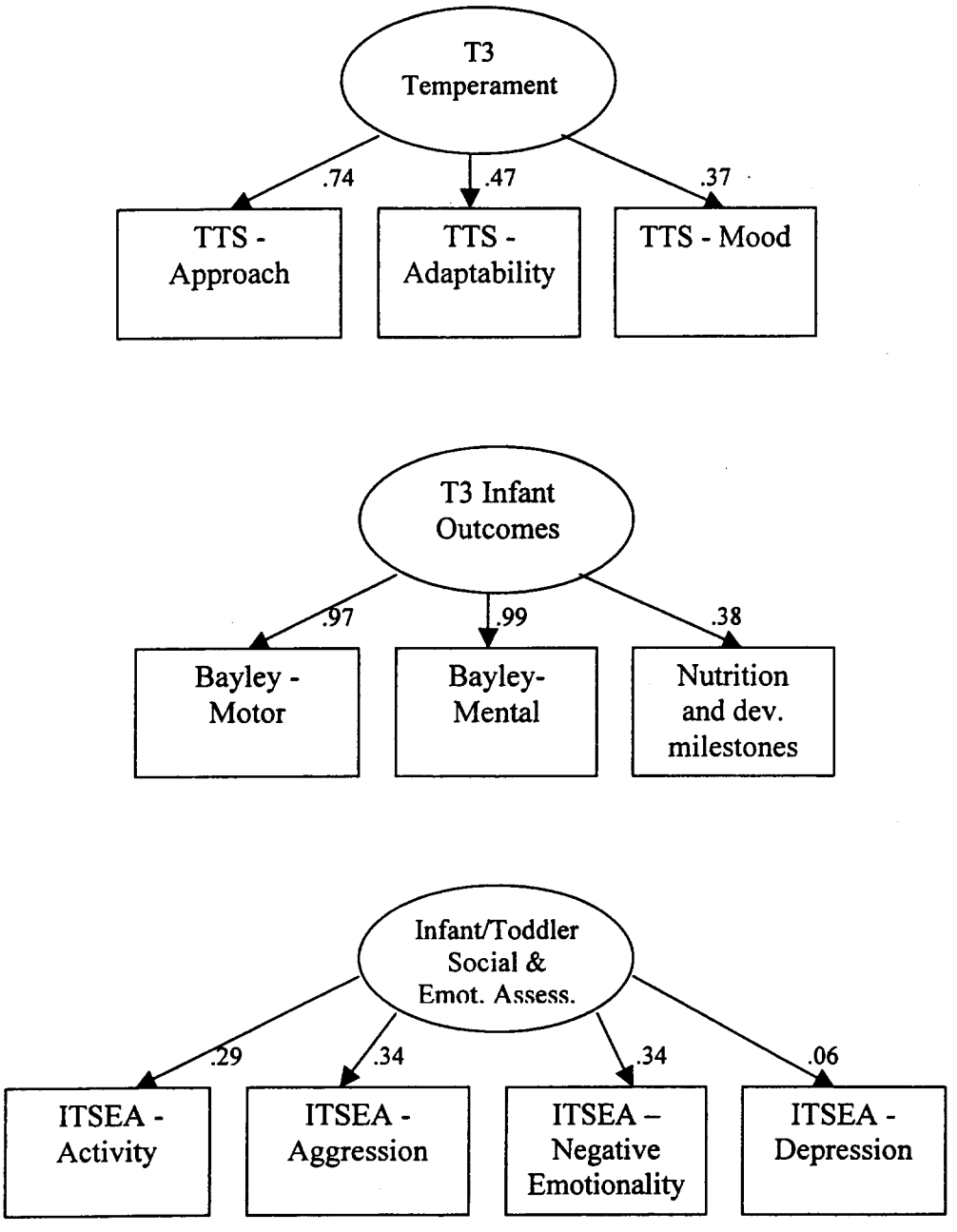

Table 1: Descriptive Statistics for Participants

| | Battered Women (N = 92) | Non-Battered Women (N = 115) | All Women (N = 207) |
|---|---|---|---|
| **Ethnic Background** | | | |
| African-American | 28% | 23% | 25% |
| Caucasian | 61% | 64% | 63% |
| Latina | 3% | 6% | 5% |
| Biracial | 6% | 3% | 4% |
| Native-American | 1% | 1% | 1% |
| Asian-American | 0% | 1% | 1% |
| Other | 1% | 2% | 1% |
| **Age*** | | | |
| Mean age | 24.56 | 26.14 | 25.44 |
| **Educational Level*** | | | |
| High School graduate or less | 54% | 38% | 45% |
| Some college | 36% | 34% | 35% |
| Associates degree | 5% | 9% | 7% |
| Bachelor's degree | 2% | 12% | 8% |
| Graduate degree | 3% | 7% | 5% |
| **Currently Work Outside the Home *** | | | |
| Yes | 33% | 49% | 42% |
| **Marital Status**** | | | |
| Single, Never Married | 67% | 36% | 50% |
| Married | 20% | 57% | 40% |
| Separated | 9% | 1% | 4% |
| Divorced | 3% | 6% | 5% |
| Widowed | 1% | 0% | 1% |
| **Relationship Length**** | | | |
| Mean number of years | 3.55 | 5.49 | 4.63 |
| **Income**** | | | |
| Mean monthly income | $1,307 | $2,213 | $1,814 |
| Median monthly income | $1,000 | $2,000 | $1,500 |
| **Number of children** | | | |
| Average number of children | 1.10 | .95 | 1.01 |

* $p < .05$
** $p < .001$

Table 2. Schedule of Administration of Measures

| **DOMAIN I: DEMOGRAPHICS** | **T1** | **T2** | **T3** |
|---|---|---|---|
| 1. Education of Father (and/or partner) and Mother | X | | X |
| 2. Occupation of Father (and/or partner) and Mother | X | | X |
| 3. Household Income | X | | X |
| 4. Household Composition | X | X | X |
| 5. Domicile/Domicile History | X | | X |
| 6. Marital/Partner Status | X | | X |
| 7. Age of Mother | X | | |
| 8. Religion of Mother | | | X |
| 9. Ethnicity/Race of Father (and/or partner) and Mother | X | | |
| **DOMAIN II: DOMESTIC VIOLENCE** | | | |
| 1. Severity of Violence Against Women Scales (Marshall, 1992)<br>--mother report of current partner<br>--mother report during pregnancy<br>--mother report of child hearing/witnessing | X | | X<br>X |
| 2. Conflict Tactics Scale (Straus, 1979)<br>--mother report of current partner<br>--mother report during pregnancy<br>--mother report of child hearing/witnessing | X | | X<br>X |
| **DOMAIN III: INFANT TEMPERAMENT** | | | |
| 1. Early Infancy Temperament Questionnaire (Medoff-Cooper et al.,1993) | | X | |
| 2. Toddler Temperament Scale (Fullard et al., 1984) | | | X |

| | | | |
|---|---|---|---|
| **DOMAIN IV: MATERNAL MENTAL HEALTH** | | | |
| 1. Beck Depression Inventory (Beck et al., 1961) | X | X | X |
| 2. Rosenberg Self Esteem Scale (Rosenberg, 1965) | X | | X |
| 3. PTSD Scale for Battered Women (Saunders, 1994) | X | | X |
| 4 Brief Symptom Inventory (Derogatis & Melisaratos, 1983) --Anxiety scale | X | | X |
| **DOMAIN V: MATERNAL PHYSICAL HEALTH** | | | |
| 1. Ob/Gyn Visits/Pregnancy Health (Bogat & Levendosky, 1998) | | X | |
| 2. General Health Questionnaire (Carpenter & Lester, 1980) | X | | X |
| 3. Substance Use (Bogat et al., 1998) | X | X | X |
| 4. Injury Checklist (Sullivan, 1989) | X | | X |
| **DOMAIN VI: PARENTING** | | | |
| 1. Mother-Infant/Child Videotape Interactions | | | X |
| 2. Parent Behavior Checklist (Fox, 1994) | | | X |

| **DOMAIN VII: INFANT/CHILD OUTCOMES** | | | |
|---|---|---|---|
| 1. Newborn Health Scale (Ting, 1998) | | X | |
| 2. Bayley Scales of Infant Development II (Bayley, 1993) | | | X |
| 3. Infant-Toddler Social and Emotional Assessment (Briggs-Gowan & Carter, 1998) | | | X |
| 4. Infant Health Scale (Ting, 1998) | | | X |

Figure 3: Domestic Violence Time 1 model with path coefficients