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Intergenerational Transmission of Attachment for Infants Raised in a Prison Nursery

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Abstract

Within a larger intervention study, attachment was assessed with the Strange Situation Procedure for 30 infants who co-resided with their mothers in a prison nursery. Sixty percent of infants were classified secure, 75% who co-resided a year or more and 43% who co-resided less than a year, all within the range of normative community samples. The year-long co-residing group had significantly more secure and fewer disorganized infants than predicted by their mothers' attachment status, measured by the Adult Attachment Interview, and a significantly greater proportion of secure infants than meta-analyzed community samples of mothers with low income, depression, or drug/alcohol abuse. Using intergenerational data collected with rigorous methods, this study provides the first evidence that mothers in a prison nursery setting can raise infants who are securely attached to them at rates comparable to healthy community children, even when the mother's own internal attachment representation has been categorized as insecure.

Keywords

infant attachment; prison nursery; incarceration; intervention

Research in two areas of inquiry, early development of the human brain and the process of infant attachment, support the proposition that every child needs a consistent and responsive primary caregiver, and that such a caregiver is especially critical during infancy and early childhood (Bowlby, 1982; Dawson, Ashman & Carver, 2000; Schore, 2001; Spitz, 1945, 1956). Ainsworth, Blehar, Waters, and Wall (1978) extensively described infant attachments in a community, nonclinical sample, and from this foundation the focus of other researchers expanded to include higher-risk community and clinical groups. Insecure attachment is more prevalent in stressed than in non-stressed populations (Belsky & Fearon, 2008), and this observation has led to the development of interventions to improve the rate of secure attachment in at-risk populations (e.g., Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2003; Cicchetti, Rogosch, & Toth, 2006; Hoffman, Marvin, Cooper, & Powell, 2006).

A previously ignored group of children, many of whom are deprived of normal attachment experiences, has begun to attract research and policy attention: the children of incarcerated parents. Although much of the research has methodological limitations, findings of adverse effects on development generally converge and raise a significant public health concern (Hagen, Myers, & Mackintosh, 2005; Hanlon et al., 2007; Huebner & Gustafson, 2007; Murray

& Farrington, 2006; Poehlmann, 2005a, 2005b). A small minority of children has been offered an alternative to early and abrupt separation from their imprisoned mothers. These are the infants of women sentenced in correctional jurisdictions that provide a co-residence nursery program. Prison nurseries remove separation created by maternal incarceration as a threat to a child's development, at least during early infancy, and are increasing in number in the U.S. (Goshin & Byrne, 2009; Women's Prison Association, 2009).

Characteristics of Incarcerated Mothers: Attachment Concerns

Most incarcerated women are mothers of children below the age of 18 and resided at least part of the time with their children prior to incarceration (Glaze & Maruschak, 2008). Many mothers return to the primary caregiver role on release, although this occurs less often when sentences are long (Ehrensaft, Khashu, Ross, & Wamsley, 2003). Women in prisons and jails, compared with those in the general population, experience disproportionately greater drug involvement and addiction (Mumola & Karberg, 2006), sexually transmitted disease and HIV (Maruschak, 2008), and violent victimization (Harlow, 1999). These conditions form a uniquely female pathway to incarceration (Bloom, Owen, & Covington, 2003; Siegel & Williams, 2003) and are threats to effective parenting unless there is therapeutic intervention.

Pregnant inmates have increased mortality and morbidity related to delayed prenatal care and perinatal risks, especially during shorter confinements that allow little time for health interventions (Cordero, Hines, Shibley, & Landon, 1992; Martin, Reiger, Kupper, Mayer, & Qaquish, 1997). In contrast, a prison with adequate resources can offer a protective environment during high-risk pregnancy and early motherhood, increasing the likelihood of secure housing, suitable health care, nutrition, and sobriety (Cordero et al. 1992; Martin et al., 1997; Thompson & Harm, 2000).

Children of Incarcerated Mothers

Many children of incarcerated women experience separation from siblings, movement among multiple caregivers, and limited or lost contact with their biological mother (Snyder, Carlo, & Coats Mullins, 2001). Although most incarcerated women are allowed visits by their children, barriers range from stigma to practical matters (e.g., telephone expenses, transportation). In a national probability sample of prisoners, 58% of confined women did not see their children during their entire incarceration (Glaze & Maruschak, 2008).

Newly parturient prisoners are typically separated from their infants within hours of birth. Records of their experiences are sparse but infused with feelings of stigma, deprivation, and anger (Shelton & Gill, 1989). Imprisoned mothers report that separation from children of any age was the most traumatic aspect of incarceration (Greene, Haney, & Hurtado, 2000).

Accounts of the later development and social trajectories of children with incarcerated parents have consistently suggested multiple environmental risks, delays in social and emotional development, and high rates of intergenerational criminality during pre-adolescent through young adult years (Huebner & Gustafson, 2007; Murray & Farrington, 2005, 2006; Phillips, Erkanli, Keeler, Costello, & Angold, 2006). Lays (1992) provided one of the few descriptions of developmental deficits in preschool children. Poehlmann (2005b) reported the first measure of attachment for this population showing that two-thirds of children ages 2.5 to 7.5 years were not securely attached to either the absent mother or their current primary caregiver. This is consistent with a grounded theory study of incarcerated mothers in Rhode Island who reported they did not feel a "mother connection" to children taken from their care at early ages (Enos, 2001).

In the research literature on attachment, samples of imprisoned adults have been limited to those with psychiatric diagnoses (Frodi, Dernevik, Sepa, Philipson & Bragesjö, 2001; Lamott, & Pfäfflin, 2001; Levinson & Fonagy, 2002; van IJzendoorn, Feldbrugge, Derks, De Ruiter, Verhagen, Philipse, et. al., 1997), and there are no previous samples of prison-residing infants. The prevalence of psychosocial risk factors experienced by incarcerated mothers suggests that their attachment classifications (and those of their infants) are likely to resemble those of higher risk samples unless there is a potent intervention administered early in the parent-child relationship.

Prison Nurseries and Parenting

Prison nurseries are housing arrangements within otherwise conventionally established correctional facilities that allow an incarcerated woman to co-reside with her newborn and be the child's primary caregiver. The last published multinational survey related to prison nurseries, based on queries in 70 nations, reported that only Suriname, Liberia, the Bahamas, and the U.S. routinely separated imprisoned mothers from their infants. Indeed, in some parts of Europe, Central America, and the non-Western world, children can co-reside in prisons through their preschool years (Kauffman, 2006). Within the U.S., societal and legislative support for prison nurseries has been irregular, with an upward surge in 2006 that added nurseries in four states (Goshin & Byrne, 2009). There are currently no nurseries in the Federal prison system, and little is known about nurseries in local jails.

The majority of prison nurseries in the U.S. function under State Departments of Correction (DOC), which have administered as many as thirteen and as few as one nursery in an erratic pattern since the early 20th century (Goshin & Byrne, 2009). There are currently nine programs in eight states including California, Indiana, Illinois, Nebraska, New York, Ohio, South Dakota, and Washington with legislation in place for a proposed program in West Virginia (Women's Prison Association, 2009). Typical co-residence by infants and their mothers lasts for weeks or months during infancy, and the entry criteria and supporting resources vary widely. Historically, U.S. prison programs have provided minimal additional parenting support (see Craig, 2009, for review). Data are not collected routinely and little beyond anecdotal information is available to describe or compare such settings.

One consistent feature of U.S. prison nursery programs is that they have been based on the dual assumptions that allowing a newborn to co-reside in prison during the mother's detention will foster a positive mother-child relationship and be rehabilitative for the mother. Recidivism, one aspect of maternal rehabilitation, has been the most commonly used measure of prison nursery program success (Carlson, 2009; State of New York, 1993, 2002; Fearn & Parker, 2004). Relationship factors have received no empirical attention until the present study. Additionally, advocacy and lay literatures on this topic blend bonding, mother-child interaction, and attachment concepts, creating difficulty in determining the extent to which there is consistency in underlying principles and providing inadequate clarity to foster valid measurement of maternal-infant relationship outcomes.

Context and Purpose of Study

The data reported here are derived from a five-year intervention study of maternal and child outcomes for incarcerated women co-residing with their infants in a prison nursery program. This longitudinal study had several aims (beyond the scope of this paper) related to attachment, maternal qualities, mother-child interaction, child development over time, and maternal criminal recidivism (Byrne, n.d.). The purposes of this paper are to describe the quality of attachment representations of incarcerated mothers co-residing with their infants in a prison nursery setting; to describe the quality of their infants' attachment to them; to compare attachment in infants who co-resided with their mothers and received intervention for at least

one year in the nursery setting with those released into the community earlier; and to examine discordance between mothers' representations of attachment and their infants' attachment classifications. Data from attachment-based descriptive and intervention studies with community at-risk mother/baby samples support the potential to foster infant attachment in spite of maternal risk factors (Bakermans-Kranenburg et al., 2003; Cicchetti et al., 2006; Hoffman et al., 2006). The setting for this study does invest in programs and personnel to support parenting, including prenatal and parenting classes and contracts with full-time civilian experts in child development and nursery management. Attachment was assessed within the intervention context provided by individualized visits from Nurse Practitioners on the research team both during the prison co-residence and in the infant's first reentry year.

Our hypotheses were as follows:

1. The proportion of autonomous/secure maternal attachment representations in our sample will be significantly lower than that found in low-risk community samples, similar to that found in low socio-economic samples, and higher than that found in clinical samples.
2. Following intervention in the prison nursery, most infants will be securely attached to their mothers.
3. Despite what we expect to be high levels of insecure maternal attachment representations in the Adult Attachment Interview (AAI), discordance will exist between maternal AAI classifications and infant security as measured in the Strange Situation Procedure (SSP), because some of the insecure mothers will have securely attached children as a result of the intervention.

Method

Setting

The study setting was the New York State Department of Correctional Services (NYS DOCS) prison system which has the oldest continuously operated prison nursery program in the U.S., established in 1901 at what is now the state's maximum security correctional facility for women. In 1990, NYS DOCS established an additional prison nursery site at a geographically adjacent medium security facility for women. The original site is also the State's reception center for all women prisoners, and it is not uncommon for women received into one prison to be transferred to the other. Both nurseries operate under the same prison directives and have similar regulations, resources, programs and physical features. The more recent site can accommodate 15 mothers and babies and the original site 29. At study outset we negotiated access to both facilities in anticipation of the need to follow women who were enrolled at the main site and subsequently transferred. Of the 30 mother/baby pairs included in this report, 6 (20%) were transferred to the alternate site and all remained in our study.

When participating mothers were in prison, the intervention consisted of weekly visits by a Nurse Practitioner (NP) incorporating anticipatory guidance regarding infant development, responsive parenting, maternal life goals, and maternal coping with reentry issues using *a priori* guidelines for content along with interactive communication responsive to mothers' expressed concerns. Videotaping of mother and child in unstructured play was conducted every three months with NP feedback provided to mothers. Intervention content was modified for biweekly mail and phone delivery to all participants during the child's first reentry year and continued either with the mother or the child's primary non-maternal caregiver. The intervention had two arms; the arms emphasized either traditional health concerns or the mother-child relationship. These arms had differential effects on some outcomes but not on infant-mother attachment. Therefore, for the purposes of this report, the intervention groups

were combined. Time of reentry for both mother and child were within the control of the criminal justice system. Variations in length of stay created the opportunity to compare attachment outcomes for infants who co-resided inside the prison for shorter and longer periods of time.

Sample

In the larger study, all women were invited to participate as soon as DOCS allowed them on the prison nursery unit until the target enrollment of 100 dyads was reached. All but one woman accepted. Although we successfully conducted 69 AAIs and 42 SSPs within the context of the larger study, for the attachment aims reported here we have analyzed data from only 30 mother/infant pairs. This sample included dyads who met these two criteria: (a) both AAI and SSP data were collected, and (b) the SSP was conducted with the mother and not with a non-maternal caregiver. These 30 dyads comprised two groups by length of prison co-residence. Sixteen of these infants reached sufficient age in prison for assessment with the SSP, that is at least 12 months (Group 1: Year Co-residence, $n = 16$, mean length of prison residence = 13.0 months; $SD = 2.8$ months; range 12 to 16 months). Fourteen of these infants rejoined the free community at an earlier age because their mothers became eligible for release (Group 2: Brief Co-Residence, $n = 14$, mean length of prison residence = 6.7 months; $SD = 2.9$ months; range 2 to 10 months). Mothers in Groups 1 and 2 did not differ significantly (compared by t -tests and chi-squares) on the demographic characteristics of maternal age (mean 29.7 years, $SD = 5.9$ vs. 31.1 years, $SD = 6.2$); predominance of minority ethnicities (63% vs. 71%); history of substance abuse (50% vs. 64%), primiparity (25% vs. 21%); or active parenting role for one to eight other children prior to imprisonment (75% vs. 79%). The groups differed significantly on crime type, with more drug related crimes in Group 2, 79% vs. 31%; $\chi^2 [1, N = 30] = 4.57$, $p < .05$. All mothers were sentenced for felony crimes, 53% of which were attempted or actual possession or sale of controlled substances, followed by robbery, assault, burglary, grand larceny, and forgery. Comparison of sample demographics with the scant data made available to the public by NYS DOCS through three small one-year surveys of prison nursery participants in 1980, 1993, and 1998 (State of New York, 1993, 2002) indicate that the demographic profile of women accepted into the prison nursery program was similar across these decades and is duplicated in the current study sample. As expected, women in Group 1 spent more time in the nursery (13.7 months, $SD = 2.9$ vs. 6.6 months, $SD = 3.1$, $t(28) = 6.43$, $p < .001$) and had a longer total length of stay in prison (36.3 months, $SD = 28.8$, vs. 11.6 months, $SD = 7.2$, $t(28) = 3.12$, $p < .01$) compared to women in Group 2.

Infants in both groups began co-residency with imprisoned mothers immediately upon discharge from the community hospital where mother had been transferred for birthing. All had been monitored with standard prenatal care inside the prison from at least the second trimester. All but three infants were delivered full-term, with birth weights within the normative U.S. range. Three infants were delivered prematurely at 34–36 weeks gestational age, followed by uncomplicated intensive care unit stays of 1–3 weeks (2 infants in Group 1 and 1 infant in Group 2). Mean age of infants at reentry to the community was significantly greater for Group 1, reflecting the differences in the mother's total time spent on the nursery: 13.7 months ($SD = 1.4$; range 12–16 months) for infants in Group 1 and 6.7 months ($SD = 2.9$; range 2–10 months) for infants in Group 2, ($t(28) = 8.4$, $p < .001$).

Procedures

Following IRB approval, in compliance with federal regulations regarding prisoners as research subjects, and with the additional protection of a federal Certificate of Confidentiality, participants gave informed consent to participate in the study at the time they were accepted into the prison nursery shortly before or immediately after giving birth. They received the

weekly prison-based and biweekly community reentry intervention, and were assessed every three months while in the prison nursery and twice during the reentry year.

Maternal demographic information was collected at study outset, and AAIs were conducted near the end of the first month following enrollment. All infants in Group 1 had been living continuously with their mothers when the SSP was conducted in the prison near the anticipated release date. Infants in Group 2 continued to live with their mothers following reentry, and the SSP was conducted with the mother at a University laboratory.

Measures

Strange Situation Procedure (SSP; Ainsworth et al., 1978)—The SSP has been used and validated with thousands of children around the world (van IJzendoorn & Kroonenberg, 1988; Solomon & George, 2008). The aim of the SSP is to capture the infant's balance between confidence in maternal availability and the ability to explore under increasingly stressful conditions. Laboratories were set up within the prison and in the university research setting in accord with Ainsworth's original protocol (Ainsworth et al., 1978). Mothers and infants participated in the structured 8-episode social scenario in which they entered an unfamiliar room that contained chairs and age-appropriate toys, and the infant was exposed to arrivals and departures of a stranger and the mother over a 20-minute period. Based principally on infant behavior during separations and reunions, videotapes of the SSPs are coded into one secure or one of three insecure (avoidant, resistant, or disorganized/disoriented) categories. Videotaped sessions were sent to a primary coder (Susan Paris) who was blind to sample characteristics, setting, and hypotheses. Four (13%) of the sessions were randomly selected for coding by another experienced and blinded coder (Bonnie Conley), with 100% agreement achieved on secure/insecure categories and on disorganization ($\kappa = 1.00, p < .05$; also, 4-way $\kappa = .71, p < .05$). Distributions are reported for all four SSP categories. The three insecure groups were combined to conduct comparative analyses with meta-analyzed samples at the secure versus insecure level.

The Adult Attachment Interview (AAI; George, Kaplan & Main, 1996)—The AAI is a measure of adult "state of mind with respect to attachment" that has been used extensively in research (Bakermans-Kranenburg & van IJzendoorn, 2009; Hesse, 2008). It is a 20-question semi-structured interview that takes up to 90 minutes, during which time the interviewee is asked to provide adjectives and corroborating examples describing parental figures; to recall childhood situations of being hurt, upset, ill and rejected (all expected to invoke the attachment system); and to appraise current relationships with parent figures as well as hopes for one's child. Transcripts are coded into one secure (autonomous) or one of three insecure categories (dismissing, preoccupied, or unresolved/disorganized). For clarity in this report, autonomous mothers are referred to as secure.

Two NPs, both trained to conduct AAIs during a workshop conducted by D. Jacobvitz, conducted all interviews. Interviews were audiotaped and transcribed, and confidential identifying information was removed from transcripts in accord with the protocol established by the AAI developers (George et al., 1985, 1996; Main, Goldwyn, & Hesse, 1984, 2003). The two AAI coders (Jessica Borelli and Daryn David), trained by June Sroufe and Sonja De Gojman and certified as reliable by Mary Main, were blinded to sample characteristics. For 13 (19%) cases coded separately by both coders, agreement was high (4-way $\kappa = .89, p < .001$; 3-way $\kappa = .88, p < .001$). Distributions are reported for all four AAI categories. The three insecure groups were combined to conduct comparative analyses with meta-analyzed samples at the secure versus insecure level.

Results

Distributions of Maternal Attachment Categories

Borelli, Goshin, Joestl, Clark, and Byrne (2010) present elsewhere in this special issue (a) the AAI distribution of all 69 mothers who provided AAIs within the larger study, and (b) comparisons of that distribution to meta-analytic findings (Bakermans-Kranenburg & van IJzendoorn, 2009; van IJzendoorn & Bakermans-Kranenburg, 1996). The distribution of AAI classifications of mothers in the subsample reported here did not differ significantly from that of the larger study for secure/insecure proportions but there were fewer dismissing (10% vs. 20%) and more unresolved (43% vs. 30%) mothers. Comparisons to previous meta-analytic samples were similar to those reported by Borelli et al. (2010).

For the 30 mothers in this study, the four-way AAI distribution was: dismissing 10%, secure 33%, preoccupied 13%, and unresolved 43%. The distribution of AAI classifications in the year-long co-residing group (Group 1) did not differ from that in the brief residing group (Group 2; Table 1; $\chi^2 [1, N = 14] = 4.99, ns$). In both groups, a remarkably high proportion of women (50% in Group 1 and 36% in Group 2) were classified as unresolved.

Distributions of Infant Attachment Categories

The four-way distribution of infant attachment was: avoidant 10%, secure 60%, resistant 13% and disorganized 17%. Overall, these infants shared the modal secure infant classification reported in a cross-cultural meta-analysis of 32 non-clinical samples in eight countries (van IJzendoorn & Kroonenberg, 1988) and a later meta-analysis of over 100 normal and clinical samples from North American, European, and developing nations (van IJzendoorn, Schengel, & Bakermans-Kronenburg, 1999). Infant SSP distributions, however, differed by group. In the year-long co-residence group (Group 1, $n = 16$), 75% of infants were secure, whereas only 43% were secure in the brief co-residence group (Group 2, $n = 14$; $\chi^2(1, N = 14) = 7.71, p < .01$). For Group 1, the four-way distribution was avoidant 6%, secure 75%, resistant 0% and disorganized 19%, and for Group 2 the distribution was avoidant 14%, secure 43%, resistant 29% and disorganized 14%. Because of these group differences, comparisons to samples reported in meta-analytic studies were made by group (Table 2).

When compared with meta-analyses of SSPs for samples of community residing infants (van IJzendoorn et al., 1999), the proportion of secure infants for the year-long co-residence group (Group 1, $n = 16$) was not significantly different from that of 15 U.S. studies of low-risk mothers with infants less than 24 months of age (62%; $\chi^2 [1, N = 16] = 1.15, ns$). There were significantly more secure infants in this group than in seven studies of low socio-economic individuals (48%; $\chi^2 [1, N = 16] = 4.68, p < .05$), nine studies with depressed mothers (41%; $\chi^2 [1, N = 16] = 7.65, p < .01$); four studies with drug/alcohol abusing mothers (26%; $\chi^2 [1, N = 16] = 19.97, p < .001$); and five studies with maltreating mothers (9%; $\chi^2 [1, N = 16] = 85.10, p < .001$).

When compared with the same meta-analyses of SSPs for samples of community residing infants, the brief co-residence group (Group 2, $n = 14$; 43% secure) did not differ significantly from the 15 samples of low-risk children less than 24 months of age (62% secure; $\chi^2 [1, N = 14] = 2.18, ns$). Yet they were similar to some higher risk groups, including the low socio-economic groups (48%; $\chi^2 [1, N = 14] = .15, ns$); groups of depressed mothers (41%; $\chi^2 [1, N = 14] = .20, ns$); and groups of drug/alcohol abusing mothers (26%; $\chi^2 [1, N = 14] = 3.07, ns$). The proportion of secure infants in Group 2 was significantly higher than that reported in the five studies focusing on maltreating mothers (9%; $\chi^2 [1, N = 14] = 19.60, p < .001$).

Concordance Between AAI and SSP Classifications

Because one goal of the intervention within the context of the prison nursery setting was to foster infant security in spite of the anticipated high proportion of insecure mothers, we did not expect concordance between SSP and AAI classifications, and in fact no concordance was present ($\kappa = 0.03$, *ns*). A significantly larger proportion of secure infants was observed in the SSP than predicted by the AAI (60% vs. 33%; $\chi^2 [1, N = 30] = 9.60$, $p < .01$).

Next, maternal and infant concordance was assessed considering all possible secure/insecure pairings (see Table 3). In Group 1, there was 19% concordance with insecure AAI to insecure SSP, and 19% concordance with secure AAI and SSP. Discordance was observed between insecure mothers and secure infants nine times (56%). One secure mother raised an insecure infant. When SSP secure status was compared against AAI maternal attachment classifications, a significantly larger proportion of secure infants was observed than expected (75% vs. 33%; $\chi^2 [1, N = 16] = 12.77$, $p < .001$). In Group 2, insecure AAI to insecure SSP concordance occurred for five infants (36%), and secure AAI to secure SSP concordance occurred for three infants (21%). Classification discordance across generations was observed between insecure mothers who raised secure infants and secure mothers who raised insecure infants, each occurring only 3 times (21%) in Group 2. When SSP secure status was compared against AAI attachment classifications, the proportion of secure infants observed in Group 2 was not significantly larger than expected (43% vs. 33%; $\chi^2 [1, N = 14] = .62$, *ns*). Moreover, the proportion of insecure AAI to secure SSP discordance was significantly higher in Group 1 than in Group 2 (56% vs. 21%; $\chi^2 [1, N = 16] = 28.12$, $p < .001$).

We also examined the concordance of AAI and SSP using all four classification levels. The degree of concordance was non-significant ($\kappa = 0.05$, *ns*). There were 10 (33%) concordant AAI/SSP classifications in all, 4 (25%) in Group 1 and 6 (43%) in Group 2. There was no consistent and clear pattern of matched classifications. Of note is the significant discordance between the large proportion of unresolved AAIs (43%) compared with the proportion of disorganized SSPs (17%), which, while still relatively large, mirrored that of meta-analyzed normal U.S. community samples (15%; van IJzendoorn et al., 1999). There occurred significantly fewer children with attachment disorganization than anticipated by the high proportion of unresolved mothers ($\chi^2 [1, N = 30] = 8.49$, $p < .01$).

Discordant AAI/SSP pairings occurred twelve times (75%) in Group 1 and included mainly five unresolved and three preoccupied mothers who raised secure infants. Discordant AAI/SSP pairings occurred eight times (57%) in Group 2 in no apparent pattern. There were significantly fewer children with attachment disorganization than anticipated by the proportion of unresolved mothers in Group 1 (50% vs. 19%; $\chi^2 [1, N = 16] = 6.25$, $p < .05$), and fewer than expected in Group 2 at a trend but non-significant p-level (36% vs. 14%; $\chi^2 [1, N = 14] = 2.87$, *ns*).

Discussion

Using intergenerational data collected with rigorous methods, this study provides the first evidence that mothers in a prison nursery setting can raise infants who are securely attached to them at rates comparable to healthy community children, even when the mother's own internal attachment representation has been categorized as insecure. Prior to this study, neither distributions of maternal and infant attachment categories nor the concordance between them had been described for prison nursery participants. Comparisons with other populations and with normative data have been made but causal links cannot be established. Nevertheless, this study contributes to the fields of attachment and of criminal justice by providing reliable data tracing mother to infant attachment patterns in a vulnerable population and an unusual child-rearing environment for which no prior data of this type have been published.

Maternal AAI Attachment Distribution

The secure AAI distribution for this sample was the inverse of low-risk samples, similar to that of low socio-economic groups, and higher than that of seriously ill clinical samples, as we had predicted. Divergence of the distribution from forensic clinical samples is not unexpected because seriously mentally ill and violent prisoners would be screened out of the prison nursery program. Yet many of the women in our sample did have mental health needs including depressive symptomatology (Borelli et al., 2010). Similarities to low socioeconomic samples were not surprising, as the needs for housing, child care, and employment continued during the critical reentry period. During the biweekly contacts we maintained in the first reentry year, every one of our participants reported challenges to obtaining and maintaining these basic resources.

Infant Attachment Distribution

The infant secure attachment distribution in our sample was remarkably similar to meta-analyzed low-risk community samples (60% vs. 62%) and diverged markedly from the proportion of secure mothers in the AAI distribution. Notably, the proportion of disorganized infants was significantly smaller than what could be anticipated from the proportion of unresolved mothers, and in fact matched that of normative samples. This is an important outcome because whereas the organized infant classifications are considered adaptive, disorganization has been shown to be a major risk factor for the development of child psychopathology (Deklyen & Greenberg, 2008) and one that warrants early intervention (Cicchetti et al., 2006).

Secure infant attachment was more likely in the year-long than the brief co-residing group. We speculate that this can be attributed to longer protective effects of the prison for the former and earlier exposure to environmental risks for the latter. Protection may have included camaraderie shared among some women, the presence of civilian staff with developmental and counseling expertise, a relative absence of drugs and alcohol, and the availability of informal triadic relationships (i.e., mother, child care staff, and infant), all of which we observed, and that together contribute to the creation of a situation in which the long process of becoming attached is nurtured. Decades ago, Spitz (1945) Spitz (1953) reported research observations made in this same prison nursery. He noted that in contrast with his Foundling Home control "... (penal) Nursery provides each child with a mother to the nth degree, a mother who gives each child everything a good mother does..." (Spitz, 1945, p.63).

Early return to the community included exposure to social and environmental risks that can disrupt attachment. Mothers on work release programs had to become employed quickly and locate child care in neighborhoods with limited options. Family reunification, decisions about previous partner relationships, loneliness, social stigma, housing, and sources of steady income were concerns mothers consistently described. Mothers in the brief co-residing group also had been incarcerated for significantly more crimes associated with possession and sale of drugs and two-thirds of the mothers in this group had substance abuse histories. In reentry they had to make difficult decisions about avoiding the illegal drug trade as an income source, altering prior associated relationships, and remaining sober. All of these factors help to explain why the proportion of secure infants in this group was not different from those raised by groups of low-income, depressed, or drug/alcohol abusing mothers.

We also speculate about the positive effect of the study intervention on mother-infant attachment outcomes for both groups. Our sample had high cumulative risks, yet comparable interventions with mothers sharing some of these risks have yielded positive outcomes. Olds and colleagues' (1988) successful home visiting program implemented by public health nurses for at-risk primiparous mothers included elements similar to those identified as effective in

attachment-oriented intervention studies (Bakermans-Kranenburg et al., 2003; De Wolff & van IJzendoorn, 1997). Likewise, our NP interventionists provided individualized visits and follow-up contacts with tailored content focusing on specific moments of maternal-infant behavior, fostering each mother's sensitivity to infant development, and encouraging reflective narration about the child as a unique person. Substantial increases in infant secure attachment were achieved whether the intervention content emphasized health or relationships; these findings parallel those from a trial conducted to prevent attachment disorganization in maltreating families in which both the psychoeducational parenting and the infant-parent psychotherapy arms achieved proportionately more secure attachment (Cicchetti et al., 2006). While preliminary, findings from a psychoanalytic intervention pilot in UK prison Mother-Baby Units included increased maternal reflective functioning following group sessions focused on attachment themes (Baradon, Fonagy, Bland, Lenard, & Sled, 2008).

Concordance and Discordance Between AAI-SSP Classifications

In this study, the proportion of secure children was markedly higher than what would have been anticipated by maternal AAI classifications, particularly in the group that co-resided for a year. Concordance for higher risk samples has been less frequently reported than in low risk samples and results do not converge. Both significant correspondence and low concordance have been reported (Dozier, Stovall, Albus, & Bates, 2001; Levine, Tuber, Slade, & Ward, 1991). In the present study, lack of concordance was explained, as predicted, primarily by the occurrence of insecure mothers raising secure infants following intervention.

Limitations of the Study

The major limitation of this study is reliance on between-group and normative comparisons in the absence of a randomly selected control group. Effects of the prison nursery itself cannot be separated from the enhanced intervention we provided (nor the interaction between the two). Women could not legally be randomized to being on the nursery or not, as NYS Criminal Law statute 611 provides the right to inmates giving birth to have their child returned with them to the correctional institution (Births to inmates, 2006).

This study was also limited by the relatively small sample size, but these are typical numbers for a prison nursery census and also for attachment studies of high risk groups (other than meta-analyses). A larger sample would have permitted more subgroup analysis including comparisons across the four attachment categories. The number of dyads available for analysis at four levels is quite small so caution needs to be used in interpretation.

This study did not assess all the variations in attachment and separation that need to be considered for co-residents of prison nurseries. To avoid confounders, dyads were included only if they remained together until the initial SSP was conducted. In reality, it is not uncommon for infants admitted into prison nursery programs to be released into the free community before their mothers or to be separated from their mothers some time during the reentry years. These processes deserve further study.

Implications of Findings for Future Research

The current upward trend in establishment of prison nurseries may create opportunities for replication of this research. Using the AAI and SSP assessments in criminal justice settings is challenging but provides credible data that can be compared with existing findings. Gaining access to a private room, video cameras, and twenty minutes of unchaperoned time with prisoners and their children for the SSP can be difficult inside a prison. Sufficient time to conduct an uninterrupted interview and the capacity to audio-record for coding are essential conditions for the AAI. Privacy is rare in a prison setting, time with prisoners is subject to unscheduled observations and interruptions, and recording devices are contraband.

Manageable data collection with the AAI and the SSP depend on early negotiations with prison officials. Consistent, long-term understandings are crucial for longitudinal studies (Byrne, 2005).

As more prison nurseries are established in the U.S., it will be useful to compare their various eligibility criteria, lengths of stay, and supportive programming and to measure effects. Nationally and globally, there are wide variations created by circumstances and tradition but not yet guided by evidence (Byrne, 2009). Community alternative programs are increasing, and the outcomes for mother and child participants should also be rigorously measured (elsewhere in this special issue see Cassidy et al. (2010) for description of a jail diversion sample). Comparison studies across states with and without prison nurseries and multi-site studies with pooled outcome data may overcome the limitations of a small sample size. International studies can identify culturally specific approaches and outcome differences.

When secure attachment is achieved in response to interventions such as ours, it remains to be discovered how stable this will remain over time. Bowlby (1973/1985) pointed out that attachment depends on contextual stability in the early years of life. Our ongoing research during reentry will reveal risks the long-residing secure infants face when they move into the free community and how they respond.

Implications for Criminal Justice Programs for Women and Children

The longevity of the attachment process and the resources needed merit thoughtful planning. While the mother is becoming the primary attachment figure, consideration needs to be given to potential threats created by separations. Administrative foresight in some prison nurseries has resulted in availability of trained caregivers to bridge the different kinds of short-term separations likely to occur (WPA, 2009). One approach has been to screen and train other incarcerated women to be mother's helpers and to stand in as emergency alternate caregivers. When incidents suggesting inadequate parenting occur, these cases are typically handled with immediacy and with the paramount goal of protecting the child. Corrections officials need more time and support to prepare either the mother or the child for the separation and to consider alternative caregiving arrangements.

Transitional planning is crucial for infants whose attachment is supported by corrections programs and then interrupted by them early in the first year, but remains important for scheduled releases as well. Typical celebrations of the first birthday in this study setting are poignant when followed by infant-mother separation, and they serve as reminders that a change to an alternate caregiver at 12 months requires preparation and support for all involved. Rationales must be developed to determine to what extent the length of mother's incarceration should be part of the eligibility criteria for a nursery program. In many states only women with a short sentence are allowed into the prison nursery. In all nurseries the infant's maximum length of stay is defined but this varies widely from 30 days (South Dakota) to three years (Washington State). Our study findings suggest that longer stays provide additional protection for the attachment process. Nevertheless, shorter stays are effective too. Especially for infants with no other alternatives, the opportunity to receive maternal care in an environment that supports parenting may be critical to future development. Neurochemical systems that regulate social behavior have been shown to be strongly affected by parental nurturing in infancy and in the absence of quality maternal care can be abnormally developed and stimulate reward pathways associated later in life with violence and addiction (Pedersen, 2004). Mothers and infants who have a briefer stay in a prison nursery and less intervention may require even more attention to changing personal and environmental risk factors in the reentry communities, changes that will depend on both individual and societal resources.

Conclusion

A significantly elevated rate of insecure attachment characterized the AAI distribution of the incarcerated women in this sample. Following a brief but individualized and repeated intervention delivered by Nurse Practitioners, the proportion of infants securely attached to their mothers was similar to that described in meta-analytic reports of low-risk community samples. Infants who lived with their mothers for a year or more in the prison nursery program were significantly more likely to be securely attached in spite of their mothers' insecurity than those who were released earlier.

Following intervention, the intergenerational insecure-to-insecure cycle can be broken, although causal links remain to be clearly established. Development of an attachment relationship is a long and fragile process and requires ongoing supports for mothers raising infants in prison nurseries, for future alternate caregivers living in the community, and for the children who will ultimately experience a multitude of environmental risks.

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Table 1
Three Category and Four Category Distributions of AAI Classifications for Mothers Whose Infants Participated in the SSP

	Three-way			Four-way		
	Dismissing (#) %	Autonomous (#) %	Preoccupied (#) %	Dismissing (#) %	Autonomous (#) %	Preoccupied (#) %
All Study Mothers (<i>N</i> = 30)	(7) 23.3	(14) 46.7	(9) 30.0	(3) 10.00	(10) 33.30	(4) 13.30
Group 1: Year Co-Residence (<i>n</i> = 16)	(2) 12.5	(7) 43.8	(7) 43.8	(1) 6.2	(4) 25.0	(3) 18.8
Group 2: Brief Co-Residence (<i>n</i> = 14)	(5) 35.7	(7) 50.0	(2) 14.3	(2) 14.3	(6) 42.9	(1) 7.1
						(5) 35.7

Table 2

Three Category and Four Category Distributions of the SSP for Study Infants

	Three-way			Four-way			
	Avoidant (#) %	Secure (#) %	Resistant (#) %	Avoidant (#) %	Secure (#) %	Resistant (#) %	Unresolved/Cannot Classify (#) %
All Study Infants (<i>N</i> = 30)	(3) 10.0	(18) 60.0	(9) 30.0	(3) 10.00	(18) 60.00	(4) 13.30	(5) 16.70
Group 1: Year Co-Residence (<i>n</i> = 16)	(1) 6.3	(12) 75.0	(3) 18.8	(1) 6.3	(12) 75.0	(0) 0.0	(3) 18.8
Group 2: Brief Co-Residence (<i>n</i> = 14)	(2) 14.3	(6) 42.9	(6) 42.9	(2) 14.3	(6) 42.9	(4) 28.6	(2) 14.3

Table 3

Concordance of Secure/Insecure Maternal AAI and Infant SSP Classifications

		Maternal Attachment Representation (AAI)		
		Insecure	Secure	Total
Infant-Mother Attachment (SSP)		<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Total Sample (<i>N</i> = 30)	Insecure	8 (27%)	4 (13%)	12 (40%)
	Secure	12 (40%)	6 (20%)	18 (60%)
	Total	20 (67%)	10 (33%)	30 (100%)
Year Co-Residence (Group 1, <i>n</i> = 16)	Insecure	3 (19%)	1 (6%)	4 (25%)
	Secure	9 *** (56%)	3 (19%)	12 (75%)
	Subtotal	12 (75%)	4 (25%)	16 (100%)
Brief Co-Residence (Group 2, <i>n</i> = 14)	Insecure	5 (36%)	3 (21%)	8 (57%)
	Secure	3 (21%)	3 (21%)	6 (42%)
	Subtotal	8 (57%)	6 (42%)	14 (99%) ^{<i>I</i>}

^{*I*} Total is less than 100% because of rounding.

*** There was significantly more insecure mother to secure infant discordance in Group 1 than anticipated by the AAI ($\chi^2 [1, N=16] = 14.3, p < .001$).