Report to the International Psychoanalytic Association
May 10, 2012

From Infancy to Adulthood: Vocal Rhythm Coordination in Infancy, 12-Month Attachment, and Young Adult Follow-up

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Abstract

We report on a follow up of 16 dyads of a community sample, collected in infancy 1985-89, and seen again when offspring were 21 - 22 years old. The number of dyads evaluated here is small, and the associations reported are preliminary. Nevertheless, this is a rare and valuable data set, and the associations we found are encouraging. Data collection on this study remains ongoing. Assessments of vocal turn taking coordination in infancy during mother-infant and stranger-infant face-to-face interaction predicted young adult outcomes, for offspring and mother Adult Attachment Interview scales, depression, dissociation, and maternal anxiety (all $p < .05$). Infant attachment status at 12 months (secure/ insecure) did not predict young adult offspring or mother attachment status on the AAI, and did not predict young adult attachment status on the Conflict Resolution assessment. It is remarkable that assessments of vocal turn taking coordination in infancy predict young adult outcomes, and even more remarkable with such a small group of 16 dyads assessed at young adult outcome.

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From Infancy to Adulthood: Vocal Rhythm Coordination in Infancy, 12-Month Attachment, and Young Adult Follow-up

Most theories of personality development assume that patterns form early in life and that some transformational trajectory of these patterns can be identified in adulthood. Only in the last decade, however, have we seen predictions of young adulthood outcomes from measures in infancy. These studies have changed the landscape of our understanding of the relevance of infancy for adult development. However, these studies remain few, and difficult to pursue.

We report on young adult follow up assessments of 16 dyads from Cohort I, a community sample, collected in infancy1985-89. In infancy we assessed 4- and 12-month vocal turn taking coordination during mother-infant and stranger-infant face-to-face interaction, and we assessed 12-month attachment (Ainsworth Strange Situation). At follow up offspring were 21 to 22 years old; mothers ranged 48-61. Although we had proposed to study 30 dyads, because we received half the funding from the IPA that we applied for, we were able to examine roughly half the dyads anticipated. Although the number of dyads is small, this is a rare and valuable data set, and we have a good beginning. The statistical power for 16 dyads is very low, and *all associations reported here are preliminary.* Nevertheless, the associations we did find are encouraging. There were many analyses that we could not do with such a small N. Data collection on this study continues to be ongoing.

Purpose

We examined associations between measures of social development in infancy, and measures of social development and mood in early adulthood. Whereas the existing follow-up studies from infancy to adulthood typically begin with 12-month attachment[1], our study begins with 4-month as well as 12-month infant-adult interaction. Specifically, we examined associations of two infancy measures, (a) vocal rhythm coordination during face-to-face interaction at 4 and 12 months, in mother-infant and stranger-infant interactions, and (b) 12-month infant-mother attachment security (Ainsworth Strange Situation paradigm), with later patterns of (a) attachment, (b) conflict resolution, and (c) self-report mood and dissociation in young adulthood. We did not examine vocal rhythm coordination in young adulthood for this report.

General Hypothesis: In our prior work in this Cohort, patterns of face-to-face communication at 4 months (assessed by vocal turn taking coordination) predicted patterns of attachment at one year (assessed by the Ainsworth Strange Situation).[3] *Together these two key developmental assessments in infancy set a transformational trajectory that affects the future course of attachment and quality of relatedness in young adulthood.*

Four-month vocal rhythm coordination between mother (M) and infant, and "stranger" (S) (novel partner) and infant, predicted attachment at 1 and 4 years in this cohort.[3,4] The stranger–infant (S-I) interaction provides an age-appropriate novelty challenge which predicted infant outcomes just as robustly as the mother-infant interaction.

"Coordination" refers to interpersonal contingency (assessed by time-series analysis), in which either partner's behavior can be predicted from that of the other, across the entire interacation. In

our prior work, 12-month attachment outcomes were "co-constructed:" both infant coordination with adult (M, S), and adult coordination with infant, predicted attachment.[2,3] Although the adult has the greater range, flexibility, and control, both partners contribute (not necessarily equally or symmetrically) to the organization of the exchange, and each partner's coordination predicts infant attachment outcomes. By beginning our study with measures of infant coordination with adult (M, S), as well as adult coordination with infant, we can assess whether trajectories to adult outcomes are predicted by both adult and infant.

Cycles of vocalizing and pausing, and of exchanging turns, define vocal rhythms, a fundamental form of communication across the lifespan, encompassing preverbal and verbal forms. The *coordination* of vocal rhythms refers to the degree to which each individual adjusts his own vocal rhythm durations so as to be more, or less, similar to those of the partner, moment-by-moment (out of awareness). Analogous to adult findings that vocal rhythm coordination indexes social relatedness such as warmth, empathy and interpersonal attraction, we propose that patterns of vocal rhythm coordination in infancy capture fundamental dialogic qualities of the social exchange and thus predict the trajectory of social development into young adulthood.[5,6]

The Jaffe/ Feldstein vocal dialogue model[3] is a lifespan model, applicable irrespective of whether the sounds are words, sounds ("ummm," "huh,") or preverbal sounds, and thus ideal for a study spanning infancy and adulthood. In this model, "dialogue" consists of a slower turn rhythm as speaker and listener exchange roles, as well as a faster "vocalization-pause" rhythm within each person's turn. A simple turntaking rule stipulates that whoever vocalizes unilaterally gains the turn. "Switching pauses" occur at the point of the turn exchange. Simultaneous speech is also coded.

For this proposal, we analyzed *switching pauses*, *which regulate the turn exchange*, because they predicted attachment more robustly than the other vocal rhythm variables.[3,4] The regulation of turntaking via the coordination of the switching pause is an ideal lifespan measure. The early studies of Jaffe, Stern and Beebe[3] showed startling similarities between time patterns of vocal and kinesic events in infancy (such as gaze, head movement), and the temporal patterns of vocalizing and pausing in adult conversation. A critical similarity is the alternating turn structure, and the mutual coordination of the switching pause duration, so that each partner pauses for a similar duration before the other takes a turn. Thus infants and mothers, and adult partners, similarly regulate the turn exchange, by correlating the duration of the switching pause.

This follow-up study provides longitudinal data in early adulthood for 16 dyads of a low-risk community sample (N=82) of mothers and first-born infants assessed at 4 and 12 months between 1985 and 1989.

Measures in Infancy

Age 4 Months
Vocal Turn Taking (Switching Pause) Coordination[3]

Age 12 Months
Vocal Turn Taking (Switching Pause) Coordination

Attachment Classification – Ainsworth Strange Situation[7]

Measures at Young Adult Follow-up
Descriptions of Instruments used at the young adult follow-up can be found in Appendix A. Graphs of distributions of all data collected can be found in Appendix B. Below we list the instruments used.

PHASE 1-Telephone Mother and offspring, in separate conversations, filled out self-report questionnaires with the interviewer:
(1) Center for Epidemiological Studies-Depression Scale (CES-D)[27]
(2) Spielberger State-Trait Anxiety Inventory (STAI) [28]
(3) Attachment security: Relationship Questionnaire – Clinical Version (RQ-CV) [29]

PHASE 2-Lab Visit.
(1) Face-to-Face Interaction, Mother and Offspring, Peer Stranger and Offspring (not analyzed for this report)[3]
(2) Adult Attachment Interview (AAI), Mother and Offspring[8,20,34]
(3) Conflict Discussion, Mother and Offspring[25,33]
(4) Self-report questionnaires: Depression (CES-D),[27] Anxiety (STAI),[28] Life Events[31] Questionnaire; Dissociative Experiences Scale (DES)[35]

Results

Results I: Assessments of Attachment
Table 1 presents all different assessments of attachment per dyad.

Table 1 about here

A. Infant Attachment at One Year
Within this sample of 16 dyads, 62% (10/16) of the infants were secure at one year and 38% insecure (3/16 avoidant, 1/16 resistant, 2/16 disorganized).

B. Adult Attachment Interviews (AAI) of Mother and Offspring
(1) At young adulthood, 68% of the offspring were secure, and all insecure classifications were avoidant. This distribution is roughly consistent with that of the general population and indicates a healthy group.
(2) Assessed when offspring were young adults, mothers were 38% secure; 62% insecure (5 preoccupied, 2 dismissive, 3 unresolved). In the AAI, preoccupied is parallel to the infant classification of resistant, dismissive is parallel to avoidant, and unresolved is parallel to disorganized.

We note that the offspring are more secure than their mothers.

C. Conflict Resolution between Mother and Offspring
(1) Approximately 44% (7/16) of offspring were classified as secure; 37% (6/16) insecure, and 19% (3/16) disorganized.

D. Relationship Questionnaire – Clinical Version (RQ-CV)
(1) Approximately 69% (11/16) of the *offspring* chose the paragraph description which is rated secure attachment as the primary self-characterization; 31% (5/16) chose paragraphs rated as insecure (3 dismissive, 1 preoccupied, 1 fear). However, one secure had secondary classifications of fear and dismissing, and a relatively high score on profoundly distrustful (dyad #016). This offspring as an infant was classified as disorganized attachment, and was classified as disorganized in both the AAI and the Conflict Resolution.

(2) 75% of *mothers* chose the paragraph description rated secure as the primary self-characterization.

(3) Inspection of the RQCV reveals that in 15 of the 16 cases, mothers and offspring match in characterizing themselves as secure vs. insecure.

Comment In this group, the different assessments of attachment do not agree. For example, the AAI characterizes the offspring as 68% secure; the Conflict Resolution characterizes them as 44% secure. A central difference in the assessments is that the Conflict Resolution addresses the state of the dyad at one particular point in time, whereas the AAI assesses a state of mind that is relatively stable across the lifetime. In addition, the AAI indicates that offspring tend to be more secure than mothers. Thus, a mismatch in level of security (AAI) in mothers and offspring would likely make it more difficult to resolve conflict, and thus lead to lower security scores in the offspring during the Conflict Resolution. Only in the self-report assessment of attachment (RQCV) do mothers and offspring characterize themselves similarly as to secure vs. insecure styles.

Results II: Four- and 12-month Vocal Turn Taking (Switching Pause) Coordination Predict Adult Attachment Interview Scales of Offspring and Mother

For all analyses using vocal rhythm coordination in infancy, we used only indices of "switching pause" coordination, which assesses turntaking. We used 8 switching pause coordination indices at 4 months, and 8 coordination indices at 12 months. At each age, there are 2 contexts, home and lab, and 4 partner configurations: M→I, I→M, S→I, I→S. For example, M→I indicates that mother prior behavior is used to predict infant current behavior: infant degree of coordination with mother.

Offspring

Infancy vocal rhythm coordination and young adult offspring AAI "state of mind"

We correlated infancy vocal rhythm coordination assessments with 3 *offspring* "State of Mind" assessments on the AAI: derogation of mother, coherence of mind, and reflective functioning. Table 2 presents these correlations. We omitted the scales of offspring's passive speech and anger at mother because these scales are typically associated with preoccupied (resistant) attachment, and none of our offspring had this classification.

Table 2A about here

(1) We ran correlations for 8 *4-month* switching pause coordination indices x 3 *offspring* "State of Mind" assessments on the AAI = 24 analyses. None were significant.

(2) We ran correlations for 8 *12-month* switching pause coordination indices x 3 *offspring* "State of Mind" assessments on the AAI = 24 analyses. Of these, 3 were significant (p=.05), 12.5%, all deriving from the stranger-infant interactions, I→S. Derogation was predicted by I→S lab coordination (r = .682, p = .015), coherence of mind was predicted by I→S home coordination (r = -.668, p = .018), and reflective functioning was predicted by I→S home coordination (r = -.575, p = .051). All significant associations had the same pattern: higher infant or stranger coordination was associated with less optimal offspring state of mind in young adulthood. Higher coordination is interpreted at vigilance. This result may fit our midrange model in which high coordination was understood as vigilance, midrange as optimal, and low as withdrawn. However, these correlations are linear, and a full understanding will await our ability to run quadratic models with a larger N.

Infancy vocal rhythm and young adult offspring "probable past experiences"

We correlated infancy vocal rhythm coordination indices with 4 *offspring* "Probable Past Experiences" assessments on the AAI: loving mother, loving father, rejecting mother, rejecting father. Table 2B presents these correlations.

Table 2B about here

(1) We ran correlations for 8 *4-month* switching pause indices x 4 offspring "Probable Past Experiences" = 32 analyses. None were significant.

(2) We ran correlations for 8 *12-month* switching pause indices x 4 offspring "Probable Past Experiences" = 32 analyses. Of these, 5 were significant (p=.05), 16%. Of the 5 findings, one concerned probable past experience regarding father, and 4 concerned that regarding mother. If we consider the 1 (of 16 analyses) finding regarding father alone, it becomes random. If we consider the 4 (of 16 analyses) regarding mother alone, they are 20%. Three of these 4 findings were based on stranger coordination with infant, (I→S coordination, home, loving mother, r = -.734, p = .007; I→S coordination, home, rejecting mother, r = .630, p = .028; I→S coordination, lab, rejecting mother, r = .577, p = .050); one was based on mother coordination with infant (I→M coordination, lab, rejecting mother, r = .745, p = .005). All significant associations had the same pattern: higher stranger or mother coordination was associated with less optimal offspring experiences in young adulthood: less loving mother or more rejecting mother.

Mothers

Infancy vocal rhythm and mother AAI "state of mind" at offspring age young adult

We correlated infancy vocal rhythm coordination assessments with *maternal* "State of Mind"

assessments on the AAI. We used all scales (because mothers had all possible attachment classifications): mother's passive speech, fear of loss of child, coherence of mind, reflective functioning, and highest unresolved mourning score. Table 2C presents these correlations.

Table 2C about here

(1) We ran correlations for 8 *4-month* switching pause coordination indices x 5 *maternal* "State of Mind" assessments on the AAI = 40 analyses. Two of 40 (5%) were significant, a random pattern of findings.

(2) We ran correlations for 8 *12-month* switching pause coordination indices x 5 *maternal* "State of Mind" assessments on the AAI = 40 analyses. Four of 40 (10%) were significant (p=.05), twice the number expected by chance. We interpret with caution. Three of the 4 findings derived from analyses of infant coordinating with mother: M→I coordination, home, reflective functioning (r = -.634, p = .036); M→I coordination, lab, passive speech (r = .704, p = .011); M→I coordination, lab, fear of loss of child (r = .761, p = .004); and one I→S coordination, lab, mother unresolved mourning (r = .719, p = .013). All significant associations had the same pattern: higher coordination was associated with less optimal maternal state of mind. This higher coordination is interpreted as vigilance.

Infancy vocal rhythm and maternal "probable past experiences" at offspring age young adult

We correlated infancy vocal rhythm coordination indices with 4 *maternal* "Probable Past Experiences" assessments on the AAI: loving mother, loving father, role-reversing mother, role-reversing father. Table 2D presents these correlations.

Table 2D about here

(1) We ran correlations for 8 *4-month* switching pause indices x 4 maternal "Probable Past Experiences" = 32 analyses. Two were significant, a random pattern of results.

(2) We ran correlations for 8 *12-month* switching pause indices x 4 maternal "Probable Past Experiences" = 32 analyses. Of these, 2 were significant (p=.05), a random pattern of findings.

Comment Our findings derive from 12-month, rather than 4-month, vocal rhythm coordination. The findings predicting the young adult offspring AAI scales are more robust than those predicting the mother's AAI scales. All the significant associations had the same pattern: higher coordination in infancy by infant or adult was associated with less optimal young adulthood offspring and mother outcomes. This result may fit our midrange model in which higher coordination was understood as vigilance, midrange as optimal, and low as withdrawn. However, these correlations are linear, and a full understanding will await our ability to run quadratic models with a larger N.

Results III: Four- and 12-month Vocal Turn Taking Coordination Do Not Predict Young Adult Conflict Resolution

We correlated infancy vocal rhythm coordination assessments with young adult conflict resolution scales. We used only infancy indices of "switching pause" coordination, which assess turntaking. We used 8 switching pause coordination indices at 4 months, and 8 coordination indices at 12 months. At each age, there are 2 contexts, home and lab, and 4 partner configurations: M→I, I→M, S→I, I→S. For example, M→I indicates that mother prior behavior is used to predict infant current behavior: infant degree of coordination with mother.

(1) We ran correlations for 8 *4-month* switching pause indices x 5 *offspring* conflict resolution scales (hostility, caregiving, odd, distracted, and respectful), 40 analyses. We ran these same analyses for the *12-month* switching pause indices, again 40 analyses. We generated a random pattern of findings for both sets of correlations.

For future hypothesis-testing, it is noteworthy that only the scale of *offspring caregiving* generated a nonrandom pattern of findings. We do not interpret for the purpose of this report. However, we note that using 4-month indices of coordination, 3 of 8 analyses were significant, 37.5%. Using 12-month indices of coordination, 1 of 8 analyses were significant, 12.5%. All the significant associations had the same pattern: higher coordination was associated with the less optimal outcome, more offspring caregiving.

(2) We ran correlations for 8 *4-month* switching pause indices x 2 *mother* conflict resolution scales (odd, distracted), 16 analyses. We ran these same analyses for the *12-month* switching pause indices, again 16 analyses. There were no findings.

Results IV: Four- and 12-month Vocal Turn Taking Coordination Predict Young Adult Depression, Anxiety, Dissociation of Offspring and Mother

We correlated infancy vocal turn taking (switching pause) coordination assessments with young adult depression, anxiety and dissociation in offspring and mother. These findings are presented in Tables 3A to 3F. We used 8 switching pause coordination indices at 4 months, and 8 coordination indices at 12 months. At each age, there are 2 contexts, home and lab, and 4 partner configurations: M→I, I→M, S→I, I→S. For example, M→I indicates that mother prior behavior is used to predict infant current behavior: infant degree of coordination with mother. Table 3A presents correlations for offspring and mother depression, Table 3B presents correlations for offspring and mother anxiety, and Table 3C for offspring and mother dissociation.

Young Adult Offspring Depression (CES-D)

Table 3A about here

(1) We ran correlations for 8 *4-month* switching pause coordination indices x 2 *offspring depression* assessments (telephone and lab) = 16 analyses. One of 16 analyses was significant, a random pattern.

(2) We ran correlations for 8 *12-month* switching pause coordination indices x 2 *offspring depression* assessments (telephone and lab) = 16 analyses. Two of 16 (12.5%) analyses are significant, from mother's coordination with infant, I → M, home (r = -.806, p = .003), and infant's coordination with mother, M → I, home (r = -.776, p = .005). Both correlations carry negative signs, indicating that the lower the coordination, the higher the depression score.

Maternal Depression (CES-D) Assessed at Offspring Age Young Adulthood

(1) We ran correlations for 8 *4-month* switching pause coordination indices x 2 *maternal depression* assessments (telephone and lab) = 16 analyses. Two of 16 analyses were significant, 12.5%. Both findings are based on infant's coordination with stranger (S → I) in the home, predicting maternal depression telephone (r = -.581, p = .029) and maternal depression lab (r = -.634, p = .015). Both correlations carry negative signs, indicating that the lower the coordination, the higher the depression score.

(2) We ran correlations for 8 *12-month* switching pause coordination indices x 2 *maternal depression* assessments (telephone and lab) = 16 analyses. One of 16 analyses is significant, a random pattern.

Comment on depression findings One-quarter of the offspring have depression scores in the clinical range (CES=-D 16+); one-quarter of the mothers in the lab context, and 1/8 of the mothers in the telephone context have such scores. Switching pause coordination in infancy predicts offspring depression (from 12-month bi-directional infant and mother coordination) and maternal depression (from 4-month infant coordination with stranger). Thus findings from both 4-and 12-month vocal coordination are present. In both offspring and mother findings, 12.5% of analyses are significant, just over twice what would be expected by chance. With a larger N, these findings are likely to become more robust. All correlations carry negative signs, indicating that the lower the coordination in infancy, the higher the depression score at young adulthood. Whereas high coordination in infancy is the risk index for AAI, low coordination is the risk for depression.

Young Adult Offspring Trait Anxiety (Spielberger)

Table 3B about here

(1) We ran correlations for 8 *4-month* switching pause coordination indices x 2 *offspring anxiety* assessments (telephone and lab) = 16 analyses. One of 16 analyses was significant, a random pattern.

(2) We ran correlations for 8 *12-month* switching pause coordination indices x 2 *offspring anxiety* assessments (telephone and lab) = 16 analyses. One of 16 analyses was significant, a random pattern.

Maternal Trait Anxiety (Spielberger) Assessed at Offspring Young Adulthood

(1) We ran correlations for 8 *4-month* switching pause coordination indices x 2 *maternal trait*

anxiety assessments (telephone and lab) = 16 analyses. Three of 16 (19%) analyses are significant, from (a) infant's coordination with stranger (S → I) in the home, predicting maternal anxiety assessed on the telephone (r = -.769, p = .001); (b) infant's coordination with stranger (S → I) in the home, predicting maternal anxiety assessed in the lab (r = -.599, p = .024); (c) mother's coordination with infant (I → M) in the home, predicting maternal anxiety assessed in the lab (r = .565, p = .035). All correlations carry negative signs, indicating that the lower the coordination, the higher the anxiety score.

(2) We ran correlations for 8 *12-month* switching pause coordination indices x 2 *maternal trait anxiety* assessments (assessed on the telephone and in the lab) = 16 analyses. Two of 16 (12.5%) analyses are significant, both from infant's coordination with stranger (S → I) in the home, predicting maternal anxiety assessed on the telephone (r = -.571, p = .053) and maternal anxiety assessed in the lab (r = -.623, p = .030). Both correlations carry negative signs, indicating that the lower the coordination, the higher the anxiety score.

Comment on anxiety findings Vocal turn taking coordination in infancy predicts maternal trait anxiety, but not offspring trait anxiety. Fifty percent of the mothers in the telephone context endorsed anxiety symptoms with scores of 40+; 25% of mothers endorsed symptoms with scores of 40+ in the lab context. Despite the lack of findings, offspring also endorsed anxiety: 37% in the telephone context, and 60% in the lab context, endorsed anxiety with scores of 40+.

Four-month vocal coordination generated 19% significant equations; 12-month coordination generated 12.5% significant equations, just over twice what would be expected by chance. Four of the 5 findings were based on infant coordination with stranger (S → I) in the home. All correlations carry negative signs, indicating that the lower the coordination in infancy, the higher the maternal anxiety score when offspring are young adults. Whereas high coordination in infancy is the risk index for AAI and Conflict Resolution, low coordination is the risk index for depression and anxiety.

Young Adult Offspring Dissociation

Table 3D about here

(1) We ran correlations for 8 *4-month* switching pause coordination indices x 1 *offspring dissociation* assessment (lab) = 8 analyses. None were significant.

(2) We ran correlations for 8 *12-month* switching pause coordination indices x 1 *offspring dissociation* assessment (lab) = 8 analyses. Three of 8 analyses (37.5%) were significant, based on (a) mother's coordination with infant in the home (I → M, r = -.758, p = .011); (b) mother's coordination with infant in the lab (I → M, r = .747, p =.008); and (c) stranger coordination with infant in the lab (I → S, r = .679, p =.022).

Maternal Dissociation at Offspring Age Young Adulthood

(1) We ran correlations for 8 *4-month* switching pause coordination indices x 1 *maternal dissociation* assessed in the lab = 8 analyses. None were significant.

(2) We ran correlations for 8 *12-month* switching pause coordination indices x 1 *maternal dissociation* assessed in the lab = 8 analyses. Three of 8 (37.5%) analyses were significant, based on (a) mother's coordination with infant in the home (I → M, r = -.689, p = .028); (b) mother's coordination with infant in the lab (I → M, r = .624, p =.040); and (c) infant coordination with stranger in the home (S → I, r = - .591, p =.043).

Comment on dissociation findings Switching pause coordination in infancy predicts offspring and maternal dissociation. Only 12-month coordination generated dissociation findings, and these were the most robust of the study, with 37.5% of offspring, and 37.5% of mother, equations significant. The pattern of both positive and negative correlations of vocal coordination in infancy with dissociation in young adulthood is complex, but the pattern is the same for both offspring and mother. Correlations in the home context were negative (irrespective of partner configuration or direction of effects), indicating that lower coordination in the home context was a risk for dissociation. In contrast, correlations in the lab context were positive, (irrespective of partner configuration or direction of effects), indicating that higher coordination in the lab context was a risk for dissociation. Whereas high coordination in infancy is the risk index for AAI scales, and low coordination is the risk index for depression and anxiety, both higher coordination in the less familiar lab context and lower coordination in the more familiar home context were risk indices for dissociation of offspring and mother.

The average DES score for college students is in the range of 10-20; 30 is often considered the clinical cut-off score**.** One offspring has a score of 44, and there are two scores at 24; the remaining scores are under 20. The mothers' highest score is 14. However, because there are no high dissociation scores in the mothers, the finding for mothers is not clinically meaningful. The finding for offspring is interesting, but only suggestive; more offspring in the clinical range would be necessary to interpret this finding.

Table 4 presents a summary of predications from vocal turn taking coordination in infancy to young adult outcomes of offspring and mother.

Table 4 about here

Results V: Prediction from 12-month Attachment Security/Insecurity to Young Adult Outcomes

(1) Infant 12-month attachment classification, and young adult AAI attachment classification of offspring and mother, are unrelated

(a) Offspring Of 10 secure infants at one year, 8/10 remained secure at 21 years; of 6 insecure infants at one year, 3/6 remained insecure and 3/6 became secure (see Table 1). Fisher's exact test, p = .30. Using the chi-square test, there was no association between infant secure/insecure classification and offspring AAI secure/insecure attachment classification ($X^2 = 1.571$, p = .242).

(b) Mothers Of 10 secure infants at one year, 4 mothers were classified secure at offspring age 21 years. Of 6 insecure infants at one year, 4 mothers were classified insecure at offspring age 21 years and 2 secure. Fisher's exact test, p = 1.00.

(c) *Life Events* It is possible that life events may help us explain the lack of association between attachment assessments at one year and young adulthood, presented in Table 5.

Table 5 about here

Two offspring began with secure attachments at 12 months, but were assessed as insecure at young adulthood on the AAI (dyads #104 and #108). Examining their pattern of positive and negative life events, it is possible that the preponderance of negative relative to positive events (6 negative to 3 positive for dyad #104, and 6 negative to 2 positive for dyad #108) may help explain this change; statistical evaluation awaits a larger sample.

Three offspring began with insecure attachments at 12 months, but were assessed as secure at young adulthood on the AAI (dyads #44, 62, 94). Examining their pattern of positive and negative life events, these dyads also showed a preponderance of negative relative to positive events (6 negative to 2 positive for dyad #44, 11 negative to 4 positive for dyad #62, and 9 negative to 3 positive for dyad #94). Thus life events do not help us understand these transformations from insecure to secure.

(2) Infant 12-month attachment and young adult Conflict Resolution attachment classification of offspring are unrelated

There is no association between 1-year attachment classification on the Ainsworth Strange Situation and 21-year attachment classification on the Conflict Resolution assessment. Of the 10 secure dyads at one year, 5 are classified secure at 21 years, and 5 as insecure. Of the 6 insecure dyads at one year, 4 are classified insecure at 21 years, and 2 as secure.

T-tests for equality of means showed no significant differences in 21-year Conflict Resolution attachment scores based on one-year secure vs. insecure attachment. Using the chi-square test, there was no association between infant secure/insecure classification and offspring Conflict Resolution secure/insecure attachment classification ($X^2 = .423$, $p = .451$).

(3) Infant 12-month attachment and young adult depression and anxiety outcomes of offspring and mother

(a) We tested B vs. nonB infant attachment status at one year in relation to 4 depression scores at young adulthood: offspring and mother, in telephone and lab contexts. Using the clinical cut-off of CES-D = 16+, 25% of offspring had scores of 16+ in both telephone and lab contexts; 2 of 16 mothers had such scores in the telephone context, and 25% of mothers in the lab context.

We ran t-tests for equality of means. One of 4 tests was significant, 25%. If infants were classified insecure at one year, mothers were likely to be more depressed at offspring age 21 years (mean mother CES-D =12.67, lab assessment,) than if infants were secure at one year (mean mother CES-D = 6.00, lab assessment) ($t = 2.157$, $p = .049$).

(b) We tested B vs. nonB infant attachment status at one year in relation to 8 anxiety scores at

young adulthood: offspring and mother, in telephone and lab contexts, for state and trait anxiety. We ran t-tests for equality of means. There were no significant findings. We note that if infants were insecure at one year, there was a trend for mothers (p=.073) and offspring (p = .086) to be more anxious (state anxiety) at offspring age 21 years. With a larger N, these associations may become significant.

Conclusion

The ways in which mothers and infants, and strangers and infants, in home and lab contexts at 4 and 12 months coordinated their rhythms of turn taking set a trajectory in development that can still be identified in young adulthood. Higher coordination in infancy, interpreted as vigilance, was the risk index for young adulthood measures of offspring AAI states of mind (less coherence of mind and reflective functioning) and probable past experiences (less loving mother, more rejecting mother). Similarly, higher coordination in infancy was the risk index for young adulthood measures of maternal AAI states of mind (less reflective functioning, more unresolved mourning). For young adulthood measures of offspring and mother depression, and maternal anxiety, lower coordination in infancy, interpreted as withdrawal, was the risk index. For young adulthood measures of offspring and mother dissociation, a complex pattern of lower coordination in infancy in the more familiar home context, but higher coordination in the more novel and challenging lab context, were the risk indices.

Infant attachment status at 12 months (secure/insecure) did not predict young adult offspring or mother attachment status on the AAI, or young adult attachment status on the Conflict Resolution. Because the 12-month attachment was treated categorically, we had no statistical power to evaluate these associations.

There is some suggestion that infant attachment status at 12 months may be related to young adult offspring and mother depression and anxiety, but we need a larger group to be able to evaluate this association.

It is remarkable that assessments of vocal turn taking coordination in infancy predict young adult outcomes, for offspring and mother Adult Attachment Interview scales, depression, dissociation and maternal anxiety. It is even more remarkable with such a small group of 16 dyads. This is the first study to show that sophisticated assessments of infant and partner moment-to-moment coordination during face-to-face interaction at 4 and 12 months can predict young adult outcomes. However, we caution that the results are preliminary.

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Table 1

Attachment Classifications in Infancy and Young Adulthood

Infancy Attachment		Young Adulthood Attachment Measures						
		AAI		Conflict Resolution	RQCV Self-Report Attachment			
					Offspring		Mother	
Dyad	Attach	Offspring	Mother	Offspring	Attach	Distrust	Attach	Distrust
16	D	A	D	Disorganized	Secure, Fear, Dismissive	4	Secure	2
44	D	B	A	Secure	Secure	1	Secure, Preoccupied	3
97	D	A	D	Insecure	Dismissing	1	Preoccupied	1
62	C	B	B	Insecure	Secure	2	Secure	1
94	A	B	B	Insecure	Secure	2	Secure	1
107	A	A	C	Secure	Secure	2	Secure	1
47	A	B	C	Disorganized	Secure	2	Secure	3
58	B	B	C	Secure	Dismissive	4	Fear, Dismissive	3
61	B	B	B	Secure	Secure	1	Secure	1
66	B	B	B	Insecure	Secure	2	Secure	1
83	B	B	D	Insecure	Secure	2	Secure	1
95	B	B	C	Insecure	Fear	5	Fear, Preoccupied	3
96	B	B	B	Disorganized	Secure	1	Secure, Dismissive	2
104	B	A	A	Secure	Secure, Preoccupied	1	Secure, Preoccupied, Dismissive	1
106	B	B	C	Secure	Dismissive	1	Fear, Dismissive	1
108	B	A	B	Secure	Preoccupied	1	Secure	1

AAI= Adult Attachment Interview, RQCV= Relationship Questionnaire- Clinical Version (Holmes & Lyons-Ruth, 2006)
Infancy attachment classifications A, B, C, D are equivalent on the AAI to D, F, E, and U.

Table 2A

Pearson Correlations Between Vocal Turn Taking Coordination at 4 and 12 Months and Adult Attachment Interview (AAI) Scales: Offspring States of Mind

Infant Vocal Coordination	Offspring States of Mind						
		Derogation		Coherence of Mind		Reflective Functioning	
	N	r	p	r	p	r	p
H4 I → M	15	.200	.474	-.237	.394	-.207	.459
H4 I → S	14	-.077	.794	.202	.489	-.078	.792
L4 I → M	14	.153	.602	-.082	.780	.156	.595
L4 I → S	11	-.009	.980	-.042	.901	-.121	.723
H4 M → I	15	.165	.557	-.055	.846	-.188	.503
H4 S → I	14	-.173	.554	.454	.103	.394	.163
L4 M → I	14	.387	.172	-.174	.552	-.355	.213
L4 S → I	11	.297	.376	-.169	.620	-.522	.100
H12 I → M	11	-.399	.224	.293	.381	.112	.742
H12 I → S	12	.190	.555	-.668	**.018**	-.575	**.051**
L12 I → M	12	.289	.362	-.400	.198	-.242	.449
L12 I → S	12	.682	**.015**	-.357	.255	.059	.856
H12 M → I	11	-.021	.951	-.197	.561	-.441	.174
H12 S → I	12	-.492	.105	.514	.087	.101	.755
L12 M → I	12	-.118	.715	.124	.701	.430	.163
L12 S → I	12	.186	.563	.073	.820	.564	.056

Correlations are 2-tailed

H4= home visit, 4 months; L4 = lab visit, 4 months; H12= home visit, 12 months; L12= lab visit, 12 months.

Table 2B

Pearson Correlations Between Vocal Turn Taking Coordination in Infancy and Adult Attachment Interview (AAI) Scales: Offspring Probable Past Experiences

Vocal Coordination Infancy		Offspring Probable Past Experiences							
		Offspring's Loving Mother		Offspring's Loving Father		Offspring's Rejecting Mother		Offspring's Rejecting Father	
	N	r	p	r	p	r	p	r	p
H4 I → M	15	-.395	.145	-.236	.398	.191	.495	-.108	.701
H4 I → S	14	.293	.309	.337	.238	-.364	.201	-.147	.617
L4 I → M	14	.083	.778	.106	.719	-.348	.223	-.220	.450
L4 I → S	11	.033	.924	.091	.789	.148	.665	.359	.278
H4 M → I	15	-.150	.593	.048	.866	.080	.778	-.287	.299
H4 S → I	14	.256	.378	.167	.568	-.295	.306	.072	.808
L4 M → I	14	-.328	.252	-.219	.453	.007	.981	-.015	.958
L4 S → I	11	-.140	.682	-.081	.813	-.216	.524	.261	.438
H12 I → M	11	.218	.520	.332	.318	-.269	.424	-.227	.502
H12 I → S	12	-.734	**.007**	-.599	**.040**	.630	**.028**	.314	.320
L12 I → M	12	-.325	.302	-.039	.904	.745	**.005**	-.187	.561
L12 I → S	12	-.089	.783	-.094	.771	.577	**.050**	.251	.431
H12 M → I	11	-.294	.380	-.145	.670	-.033	.924	.045	.896
H12 S → I	12	.413	.182	.276	.385	-.370	.237	-.046	.888
L12 M → I	12	.219	.494	.274	.390	-.115	.722	-.144	.655
L2 S → I	12	-.195	.545	-.146	.651	.100	.758	-.295	.352

Correlations are 2-tailed

H4= home visit, 4 months; L4 = lab visit, 4 months; H12= home visit, 12 months; L12= lab visit, 12 months.

Table 2C

Pearson Correlations Between Vocal Turn Taking Coordination at 4 and 12 Months and Adult Attachment Interview Scales (AAI): Mother States of Mind

Infant Vocal Coordination		Mother States of Mind													
		Passive Speech			Mother's Fear of Loss of Child			Mother's Reflective Functioning			Mother's Coherence of Mind			Mother's Highest Un-resolved Mourning		
		N	r	p	N	r	p	N	r	p	N	R	p	N	r	p
H4	I→M	15	-.084	.765	15	-.198	.480	15	.231	.408	15	-.234	.400	14	.234	.421
H4	I→ S	14	.189	.518	14	.026	.931	14	.050	.866	14	.152	.605	13	-.115	.709
L4	I→M	14	.599	**.024**	14	.182	.533	14	-.134	.647	14	-.564	**.036**	13	.012	.969
L4	I→ S	11	-.140	.681	11	.375	.256	11	.249	.459	11	-.004	.992	10	-.014	.969
H4	M→I	15	-.362	.185	15	-.307	.266	15	-.361	.186	15	-.067	.813	14	.023	.937
H4	S→ I	14	-.067	.819	14	-.137	.640	14	.442	.114	13	.434	.121	13	-.347	.245
L4	M→I	14	.332	.246	14	-.205	.482	14	-.370	.193	13	.141	.631	13	.349	.243
L4	S→ I	11	-.169	.620	11	-.233	.490	11	-.308	.357	11	-.077	.822	10	.257	.473
H12	I→M	11	-.392	.234	11	-.198	.559	11	.398	.226	11	.235	.487	11	-.493	.123
H12	I→ I	12	-.324	.304	12	-.090	.781	12	-.364	.245	12	-.140	.665	11	.176	.604
L12	I→M	12	.140	.664	12	.083	.798	12	-.095	.769	12	-.011	.974	11	.200	.556
L12	I→ S	12	.064	.843	12	.471	.122	12	-.359	.252	12	-.354	.259	11	.719	**.013**
H12	M→I	11	-.350	.291	11	.219	.518	11	-.634	**.036**	11	-.062	.856	11	.056	.869
H12	S → I	12	-.424	.170	12	.092	.775	12	.083	.797	12	.349	.266	12	-.403	.219
L12	M→I	12	.704	**.011**	12	.761	**.004**	12	-.071	.827	12	-.394	.205	12	.280	.404
L12	S→ I	12	.366	.242	12	.219	.494	12	.076	.815	12	-.120	.710	12	.405	.217

Correlations are 2-tailed

H4= home visit, 4 months, L4 = lab visit, 4 months, H12= home visit, 12 months, L12= lab visit, 12 months.

Table 2D

Pearson Correlations Between Vocal Turn Taking Coordination in Infancy and Adult Attachment Interview Scales: Mother Probable Past Experiences

Infancy Coordination	Mother Probable Past Experiences											
	Mother's Loving Mother			Mother's Loving Father			Mother's Role Reversing Mother			Mother's Role Reversing Father		
	N	r	p	N	r	p	N	r	p	N	r	p
H4 I → M	15	-.184	.512	14	-.286	.321	15	.198	.479	14	.248	.392
H4 I → S	14	-.342	.231	13	.002	.994	14	.032	.913	13	-.342	.253
L4 I → M	14	-.346	.226	13	-.455	.118	14	.259	.371	13	.581	**.037**
L4 I → S	11	.312	.350	10	.154	.671	11	-.475	.140	10	.045	.901
H4 M → I	15	-.203	.468	14	.154	.600	15	.238	.392	14	.025	.934
H4 S → I	14	.346	.225	13	.245	.421	14	-.378	.183	13	-.301	.318
L4 M → I	14	-.188	.520	13	.094	.760	14	.028	.925	13	-.568	**.043**
L4 S → I	11	-.554	.077	10	-.101	.781	11	.355	.284	10	-.217	.547
H12 I → M	11	.177	.602	10	.360	.306	11	-.201	.554	10	-.130	.721
H12 I → S	12	.317	.315	12	.120	.711	12	.019	.952	12	.234	.464
L12 I → M	12	.240	.453	11	.234	.488	12	-.255	.481	11	.038	.912
L12 I → S	12	.029	.930	11	-.076	.824	12	.128	.691	11	.285	.396
H12 M → I	11	-.562	.072	10	.186	.607	11	.462	.152	10	-.065	.859
H12 S → I	12	.182	.570	12	.418	.176	12	-.181	.574	12	-.423	.171
L12 M → I	12	-.670	**.017**	11	-.670	**.024**	12	.309	.329	11	.440	.176
L12 S → I	12	-.229	.473	11	-.242	.473	12	.030	.926	11	-.088	.798

Correlations are 2-tailed.

H4= home visit 4 months; L4 = lab visit 4 months; H12= home visit 12 months; L12= lab visit 12 months.

Table 3A
Pearson Correlations Between Vocal Turn Taking Coordination in Infancy and Depression in Young Adulthood: Mother and Offspring

	Lab			Telephone		
	N	r	p	N	r	p
Offspring						
H4 I → M	15	.152	.588	15	-.265	.340
H4 I → S	14	-.176	.547	14	.390	.168
L4 I → M	14	.249	.391	14	.159	.588
L4 I → S	11	.174	.610	11	-.169	.619
H4 M→ I	15	-.088	.756	15	-.483	.068
H4 S → I	14	.088	.765	14	-.167	.567
L4 M→ I	14	.031	.917	14	.203	.487
L4 S → I	11	-.297	.375	11	.712	**.014**
H12 I → M	11	.105	.759	11	-.806	**.003**
H12 I → S	12	.014	.966	12	-.126	.696
L12 I → M	12	-.379	.224	12	.004	.991
L12 I → S	12	-.126	.696	12	.312	.324
H12 M→ I	11	.776	**.005**	11	.155	.649
H12 S → I	12	-.049	.880	12	-.284	.372
L12 M→ I	12	-.235	.462	12	-.305	.336
L12 S → I	12	-.081	.803	12	-.102	.753
Mother						
H4 I → M	15	.190	.498	15	.349	.203
H4 I → S	14	-.093	.753	14	-.158	.589
L4 I →M	14	.152	.603	14	.158	.589
L4 I → S	11	.316	.344	11	-.087	.800
H4 M→ I	15	.256	.375	15	.072	.800
H4 S → I	14	-.634	**.015**	14	-.581	**.029**
L4 M→ I	14	.163	.577	12	-.213	.464
L4 S → I	11	.105	.758	14	-.506	.113
H12 I → M	11	.352	.289	11	-.155	.649
H12 I → S	12	.126	.696	12	.403	.194
L12 I → M	12	.158	.624	12	.210	.513
L12 I → S	12	.214	.504	12	-.035	.914
H12 M→ I	11	-.279	.407	11	-.311	.353
H12 S → I	12	-.161	.616	12	-.641	**.025**
L12 M → I	12	-.372	.234	12	-.252	.430
L12 S → I	12	-.116	.720	12	-.196	.542

H4 = home visit, 4 months; L4 = lab visit, 4 months; H12 = home visit, 12 months; L12 = lab visit, 12 months.

Table 3B

Pearson Correlations Between Vocal Turn Taking Coordination in Infancy and Anxiety in Young Adulthood: Mother and Offspring

	Lab			Telephone		
	N	r	p	N	r	p
Offspring						
H4 I → M	15	-.156	.579	15	-.090	.751
H4 I → S	14	.379	.181	14	.079	.787
L4 I → M	14	.225	.439	14	.181	.537
L4 I → S	11	.287	.392	11	-.319	.339
H4 M→ I	15	-.550	**.034**	15	-.102	.717
H4 S → I	14	.057	.846	14	.015	.958
L4 M→ I	14	-.269	.352	14	.311	.280
L4 S → I	11	-.374	.258	11	.533	.091
H12 I → M	11	-.255	.449	11	-.706	**.015**
H12 I → S	12	-.207	.518	12	-.488	.108
L12 I → M	12	-.081	.802	12	.396	.203
L12 I → S	12	.169	.599	12	.445	.147
H12 M→ I	11	-.369	.264	11	.023	.947
H12 S → I	12	.014	.965	12	-.207	.519
L12 M→ I	12	.060	.853	12	.252	.429
L12 S → I	12	.053	.870	12	.336	.285
Mother						
H4 I → M	15	.458	.086	15	.215	.442
H4 I → S	14	-.350	.220	14	-.198	.497
L4 I → M	14	.565	**.035**	14	.169	.563
L4 I → S	11	-.187	.581	11	-.342	.304
H4 M → I	15	.256	.357	15	.125	.657
L4 S → I	14	-.599	**.024**	14	-.769	**.001**
L4 M → I	14	-.064	.828	14	-.139	.637
L4 S → I	11	-.091	.789	11	-.150	.659
H12 I → M	11	-.068	.842	11	-.333	.318
H12 I → S	12	.525	.079	12	.445	.147
L12 I → M	12	-.105	.744	12	-.116	.721
L12 I → S	12	.021	.948	12	-.032	.923
H12 M → I	11	.014	.968	11	.196	.564
H12 S → I	12	-.623	**.030**	12	-.571	**.053**
L12 M → I	12	.028	.931	12	-.252	.429
L12 S → I	12	.042	.896	12	-.427	.166

H4 = home visit, 4 months; L4 = lab visit, 4 months; H12 = home visit, 12 months; L12 = lab visit, 12 months.

Table 3C

Pearson Correlations Between Vocal Turn Taking Coordination in Infancy and Dissociation in Young Adulthood: Mother and Offspring

	DES					
	Mother			Offspring		
	N	r	p	N	r	p
H4 I → M	14	.101	.730	14	.095	.748
H4 I → S	13	.052	.865	13	.280	.354
L4 I → M	13	.108	.726	13	-.014	.964
L4 I → S	10	-.262	.464	10	-.515	.128
H4 M→ I	14	-.024	.934	14	-.319	.267
H4 S → I	13	-.246	.419	13	.192	.529
L4 M → I	14	.381	.199	14	-.160	.603
L4 S → I	10	.476	.165	10	.127	.726
H12 I → M	10	-.689	**.028**	10	-.758	**.011**
H12 I → S	12	-.211	.511	12	-.203	.527
L12 I →M	11	.624	**.040**	11	.747	**.008**
L12 I → S	11	.442	.174	11	.679	**.022**
H12 M→ I	10	.055	.880	10	-.406	.244
H12 S → I	12	-.591	**.043**	12	-.406	.191
L12 M→ I	11	-.050	.884	11	-.123	.719
L12 S → I	11	.246	.466	11	.419	.199

Dissociation scales at Young Adult Follow Up were filled out in the Lab only.
H4 I → M = Home, 4 months, infant vocal turn taking predicting mother vocal turn taking (mother coordination with infant).

Table 4

Summary of Predictions from Vocal Turn-Taking Coordination in Infancy to Young Adult Outcomes in Offspring & Mother

	4 month coordination		12 month coordination	
	Offspring	Mother	Offspring	Mother
AAI State of Mind	NS	NS	3/24 S → I (3)	4/40 M → I (3) I → S (1)
AAI Probable Experiences	NS	NS	4/16 I → S (3) I → M (1)	NS
Conflict Resolution	NS	NS	NS	NS
Depression	NS	2/16 S → I (2) M→I (1)	2/16 I → M (1)	NS
Anxiety Trait	NS	3/16 S→ I (2) I→ M (1)	NS	2/16 S → I (2)
Dissociation	NS	NS	3/8 *Neg. Correlation* Home: I → M *Pos. Correlation* Lab: I → M Lab: I → S	3/8 *Neg. Correlation* Home: I → M Home: S → I *Pos. Correlation* Lab: I → M

Note. M→I, I→M, S→I, I→S = direction of effects in the time-series estimates of vocal coordination in infancy (Jaffe et al, 2001): for example, M→I = infant behavior predicated by prior maternal behavior, infant coordination with mother.

Table 5

Life Events for Young Adult Offspring and Mother

	Offspring Life Events			Mother Life Events		
Dyad	Negative	Positive	Total	Negative	Positive	Total
16	-	-	-	-	-	-
44	6	2	8	4	0	4
47	10	2	12	3	2	5
58	3	1	4	8	4	12
61	7	3	10	2	2	4
62	11	4	15	4	2	6
66	8	3	11	9	2	11
83	8	4	12	9	2	11
94	9	3	12	1	0	1
95	7	3	10	6	1	7
96	15	4	19	3	0	3
97	8	4	12	5	0	5
104	6	3	9	8	1	9
106	6	3	9	5	1	6
107	8	3	11	0	1	1
108	6	2	8	5	1	6

Note. Dashes indicate the life event was not calculated.

APPENDIX A: List of instruments

PHASE 1-Telephone Mother and offspring, in separate conversations, filled out self-report scales with the interviewer:

Center for Epidemiological Studies-Depression Scale (CES-D) (3 min) is a 20 item self-report of current nonspecific distress (within the past week) in the general population, not clinically diagnosed depression.[27] It has a high level of internal consistency across age, sex and race subgroups (alpha .85; split-half correlations corrected for attenuation .87). A score of 16+ is considered depressed; we use the scale as a continuous measure. A score of 2 SD above mean (CES-D 23+) will trigger treatment referral.

Spielberger State-Trait Anxiety Inventory (STAI) (5 min) is a 40-item self-report of anxiety symptoms (nervous, jittery, high strung).[28] State-Anxiety (SAS) evaluates how respondents feel "right now, at this moment." Trait-Anxiety (SAT) evaluates how subjects "generally feel" with an identical set of items. SAS and SAT are highly correlated. Test-retest coefficients for SAT range .73 to .86 for college students but are lower for SAS, as expected. Both forms have high internal consistency (alpha coefficients SAS .87, and SAT .90). We use SAT, rather than SAS. SAT is treated as a continuous variable.

Attachment security: Relationship Questionnaire – Clinical Version (RS-CV) The Bartholomew-Horowitz Attachment Styles questionnaire was revised to create the RQ-CV, by adding an additional attachment style description (profoundly-distrustful attachment).[29,30]

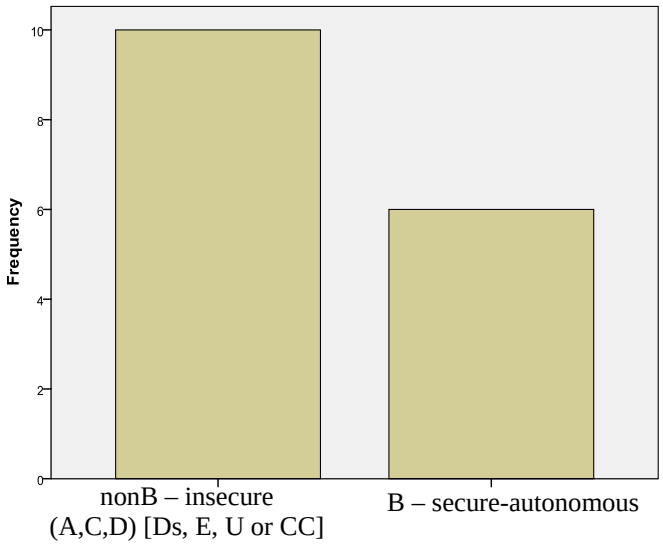
PHASE 2-Lab Visit Upon arrival at the lab, subjects sign consent forms.

(1) Face-to-Face Interaction (14 min) Dyads are videotaped/ audiotaped in face-to-face conversation, in a sound-proof IAC booth with split-screen cameras/ stereo audio recording, for two 7-min episodes: (1) M - offspring, (2) offspring -experimenter ("peer" lab assistant). M and offspring are instructed to "talk to each other as you would at home." Offspring and peer lab assistant are instructed to talk to each other as if they were meeting on an airplane. [not evaluated for this report].

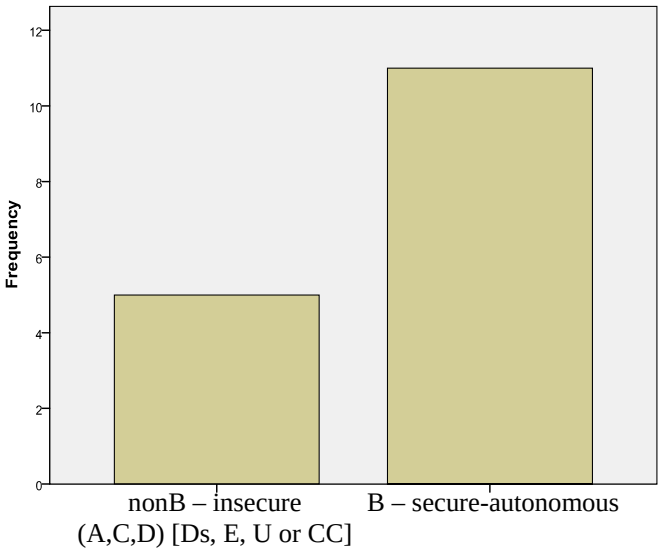
(2) Attachment Interview (60-90 min) is administered to mothers, and to young adult offspring. The AAI is a well validated measure of the individual's "state of mind" with regard to attachment experiences.[20] It is a highly structured interview in which respondents tell the story of their childhood experiences. The coherence of the individual's life history of attachment experiences, rather than the content, determines the attachment status.

(3) Conflict Discussion (20 min) M and offspring participate in an audiotaped conflict discussion. (i) Partners are separated and each fills out a conflict-issues checklist.[25] The offspring audiotapes his/her position on one issue. (ii) M reunites with offspring; they are audiotaped for 5 min.(iii) A knock on the door initiates audiotaped discussion of the conflict issue. The offspring presents his/her audiotaped position; M and offspring discuss each partner's point of view.

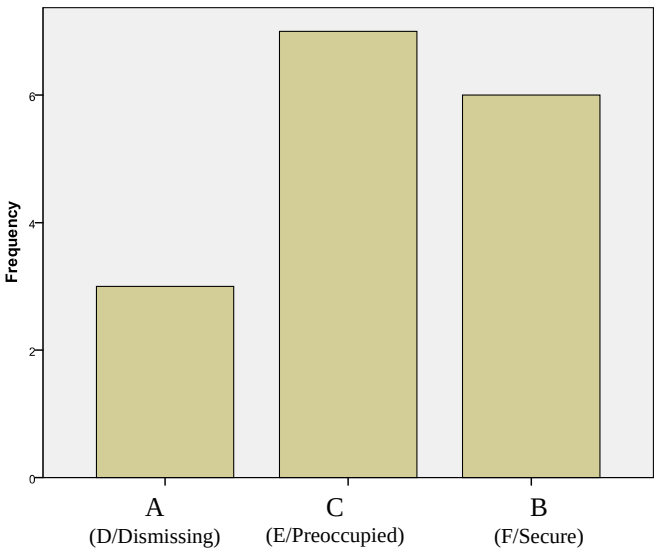
(4)Self-Report Questionnaires (45 min) Mothers and offspring fill out the following self-report scales: **CES-D, STAI. Life Events Questionnaire** is a 33-item checklist of life events (28 negative, 5 positive), generating one summary score for negative life events.[31] Negative events include loss of parent, parental separation/divorce, ill health (self/family). Internal consistency is moderate to high (alpha range from .55-.81). This scale is linked to adolescents' self-reported mental health. **Dissociative Experiences Scale II, Carlson & Putnam.** (DES) is a 28-item self-report instrument with excellent construct validity. It is a screening instrument, not a diagnostic instrument. In a sample of 345 college students, the median score was 7.9. The average DES score in college students lies between 10.0 and 20.0. A score of 30 is regarded as a cutoff score for the pathological range by many investigators.



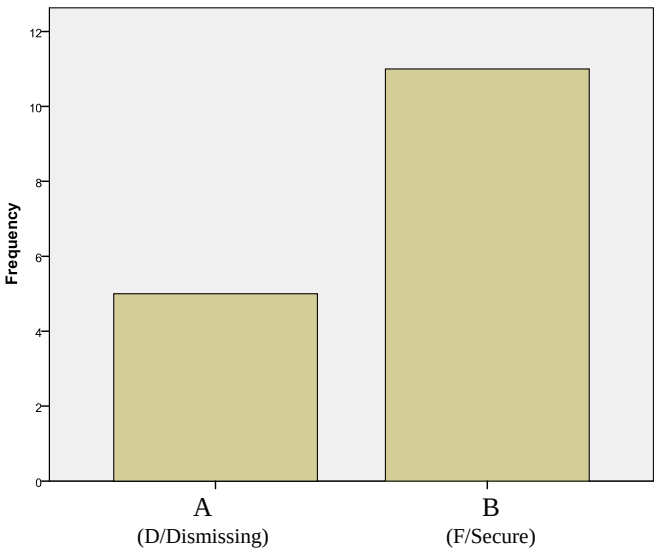
Mother's Attachment AAI
Insecure vs. Secure (B-v-nonB)



Offspring' Attachment AAI
Insecure vs. Secure (B-v-nonB)

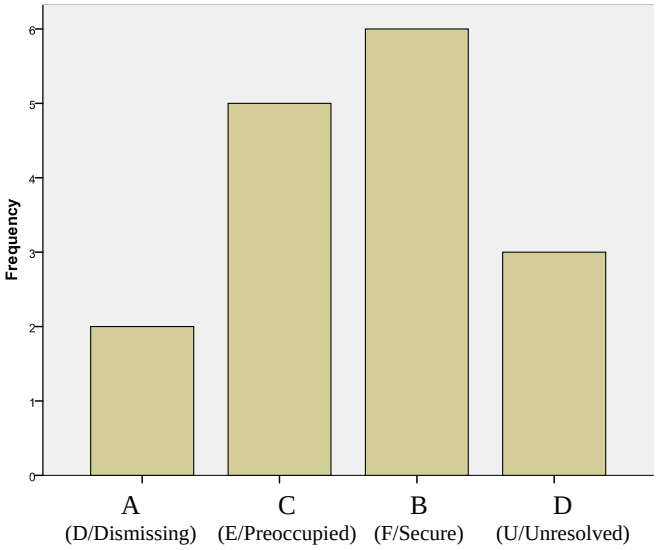


Mother's Attachment21 A,B,C

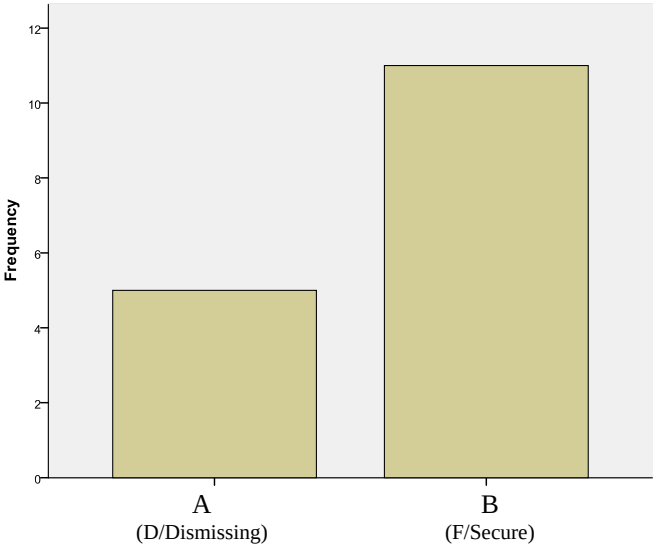


Offspring's Attachment21 A,B,C

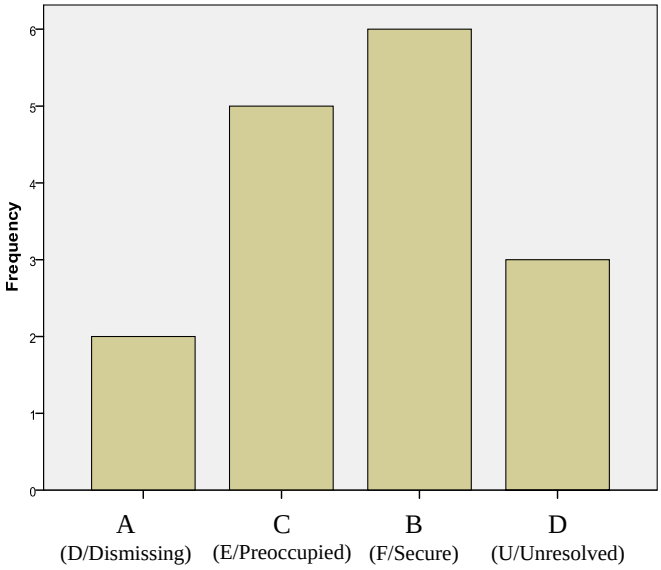
Appendix B1. Histograms of Adult Attachment Interview Scales: Mother and Offspring



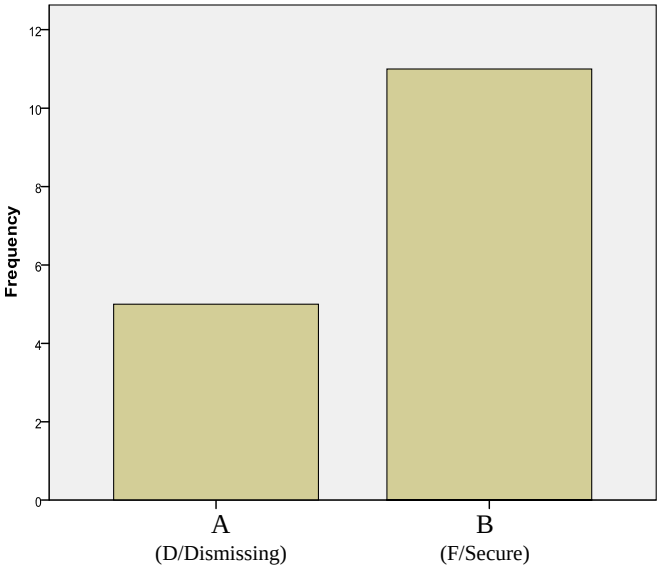
Mother's Attachment21 A,B,C,D



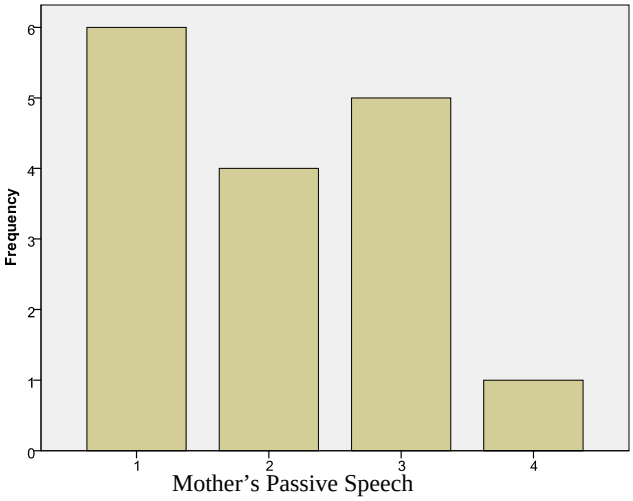
Offspring's Attachment21 A,B,C,D



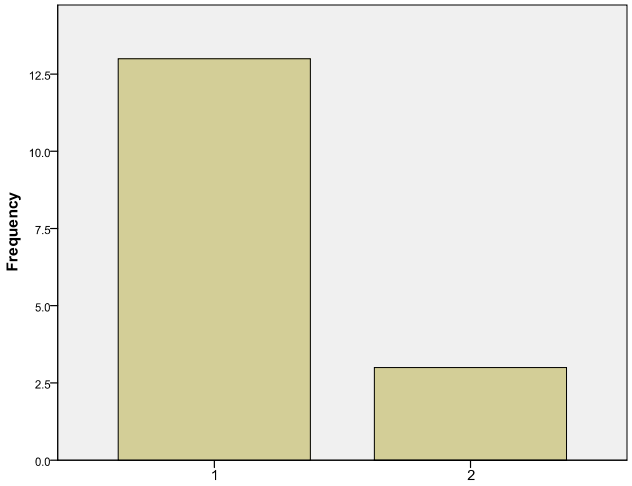
Mother's Attachment AAI A,B,C,D,CC



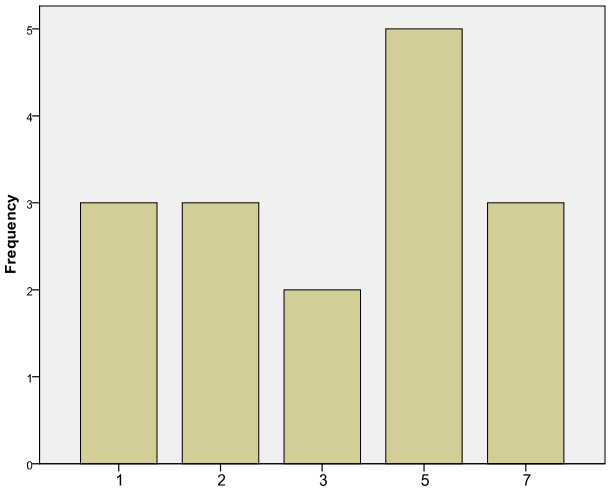
Offspring's Attachment AAI A,B,C,D,CC



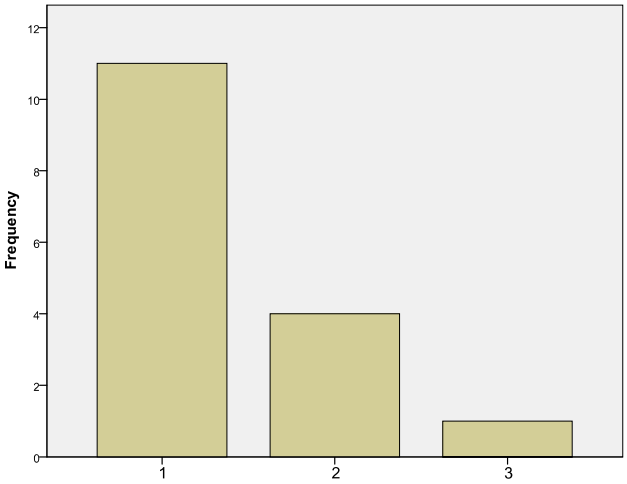
Mother's Passive Speech



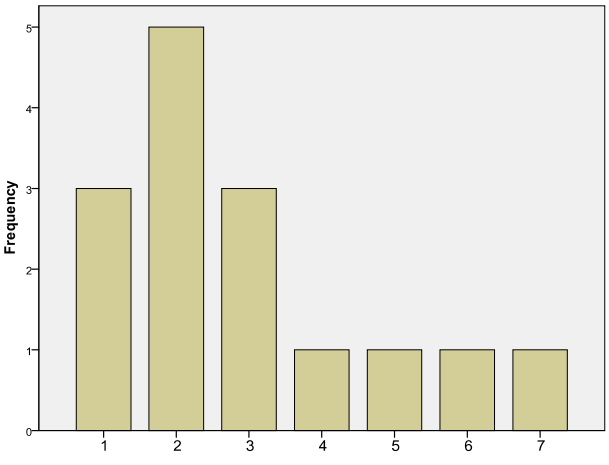
Offspring's Passive Speech



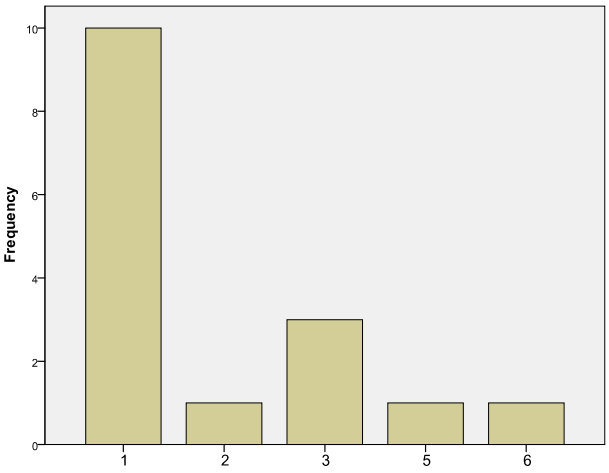
Mother's Involving anger re mother



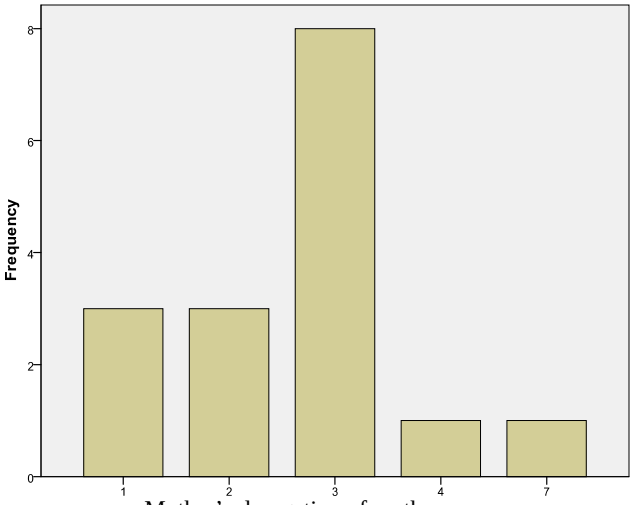
Offspring's Involving anger re mother



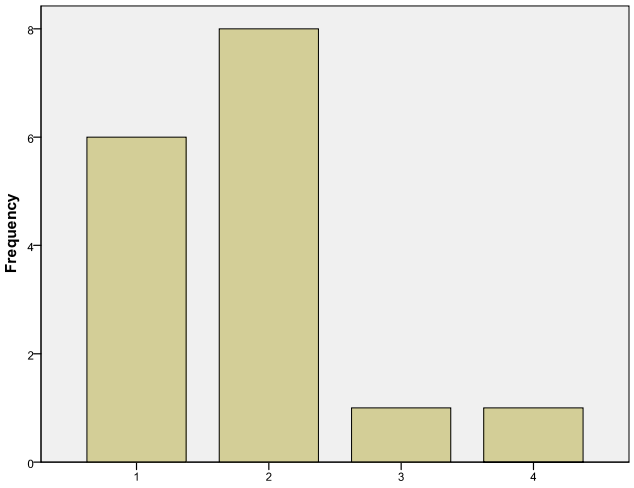
Mother's Involving anger re father



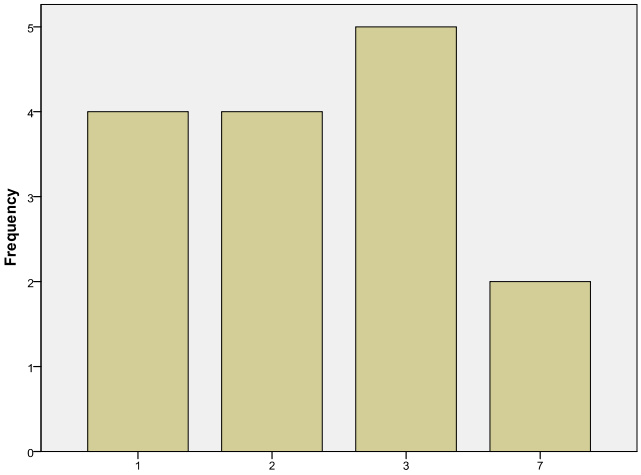
Offspring's Involving anger re father



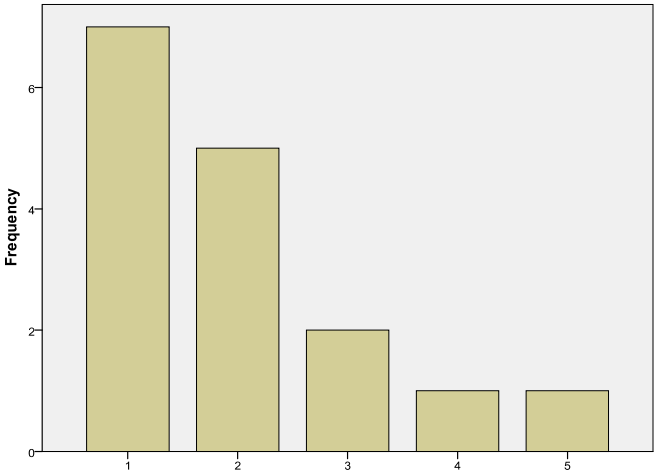
Mother's derogation of mother



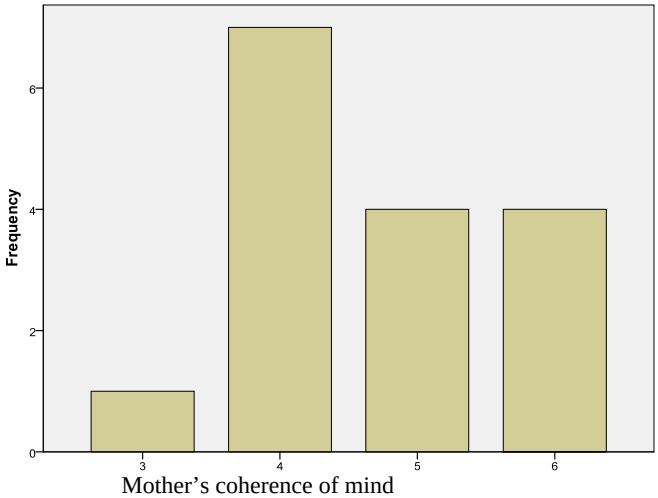
Offspring's derogation of mother



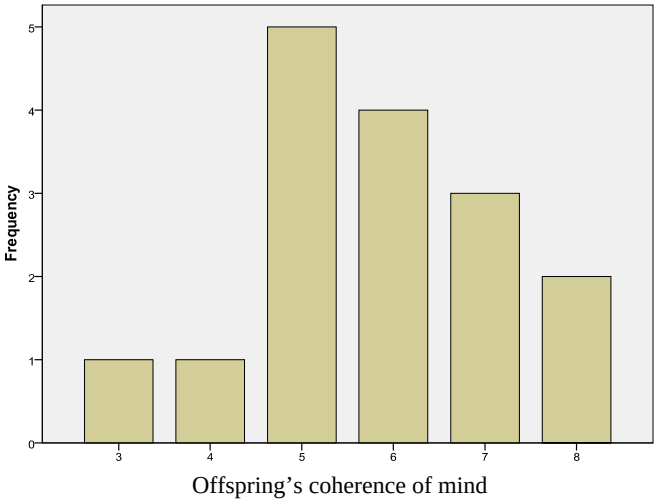
Mother's derogation of father



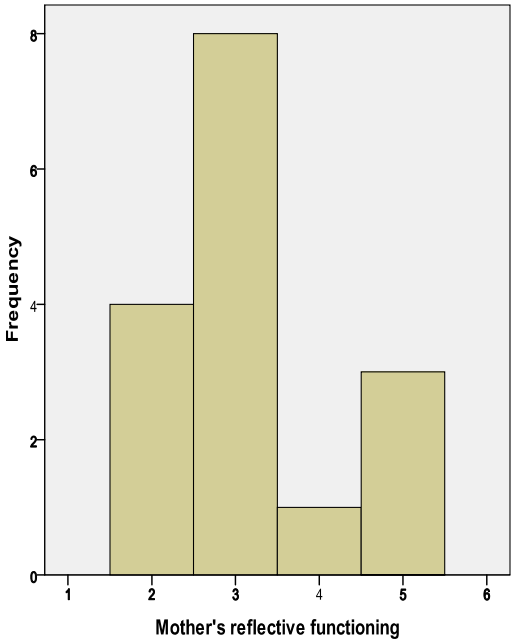
Offspring's derogation of father

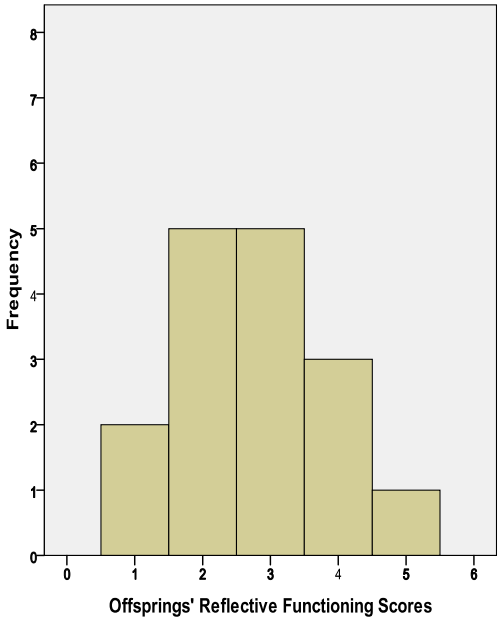


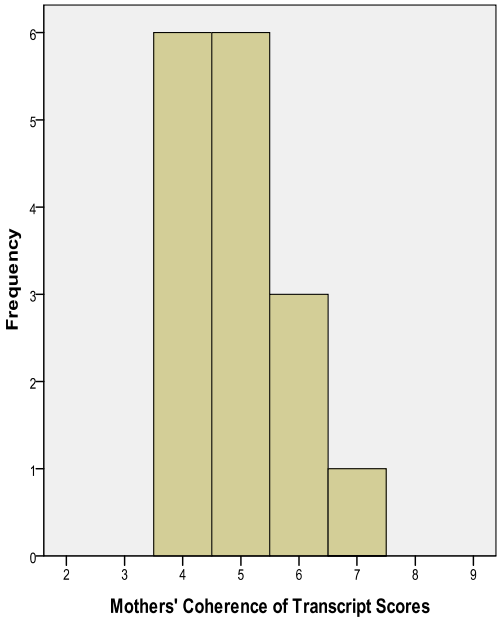
Mother's coherence of mind

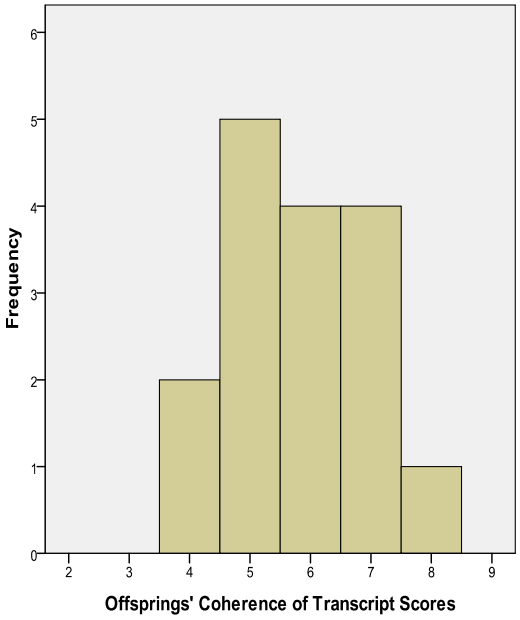


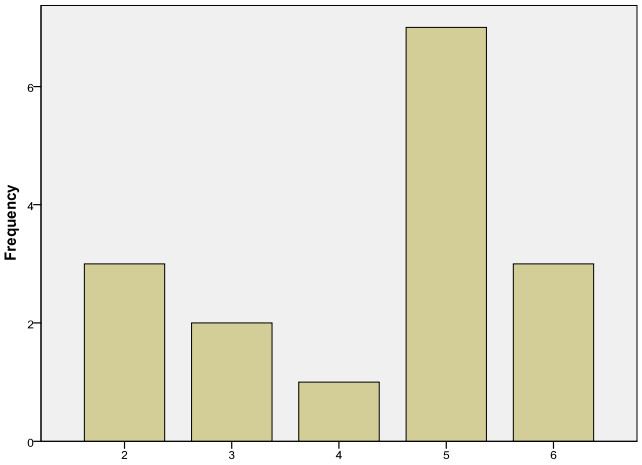
Offspring's coherence of mind


Frequency
Mother's reflective functioning

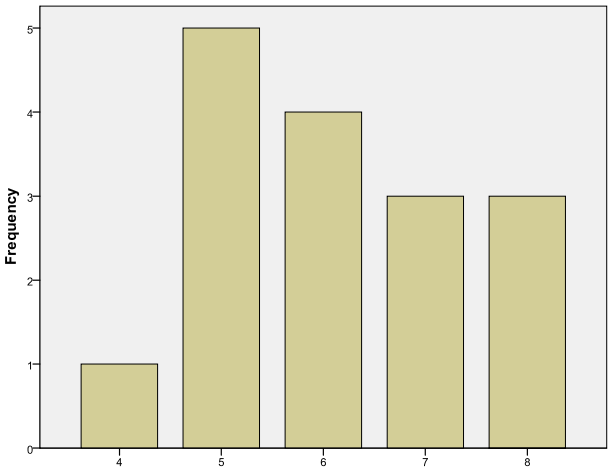

Frequency
Offsprings' Reflective Functioning Scores


Frequency
Mothers' Coherence of Transcript Scores

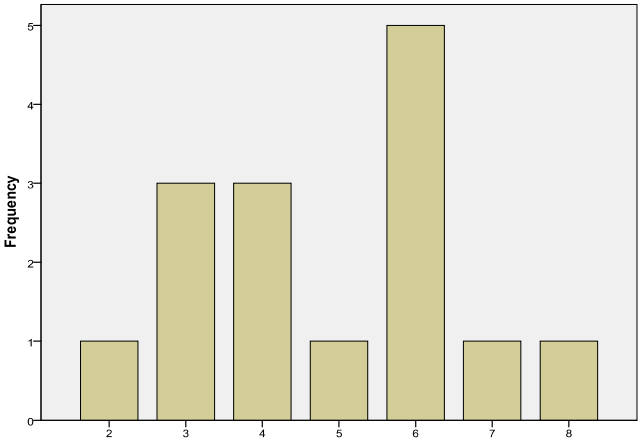

Frequency
Offsprings' Coherence of Transcript Scores



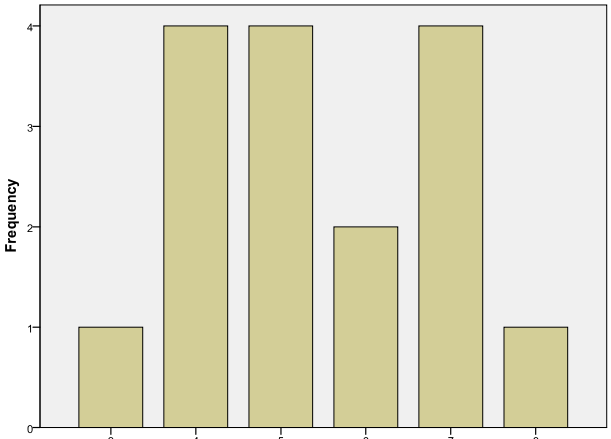
Mother’s loving mother



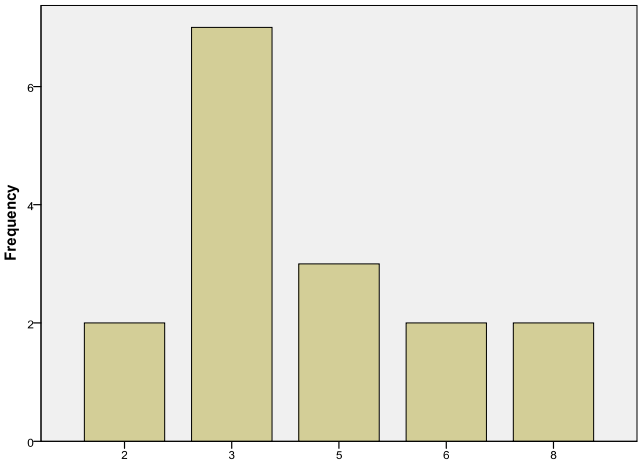
Offspring’s loving mother



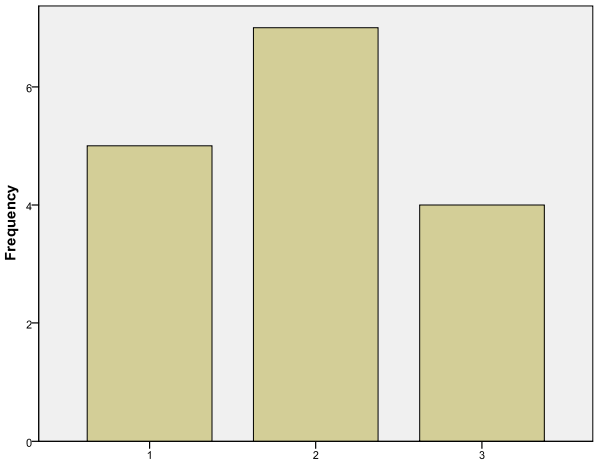
Mother’s loving father



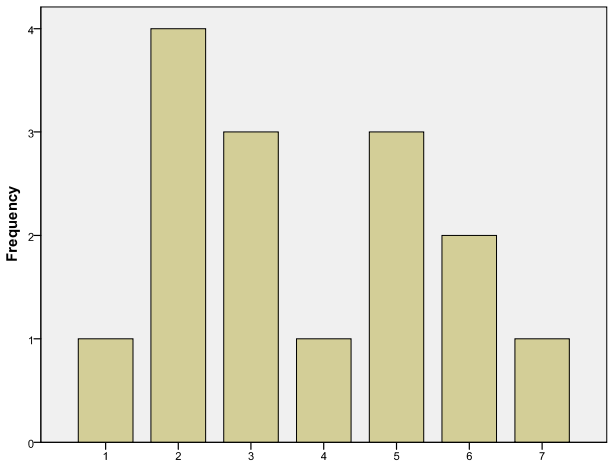
Offspring’s loving father



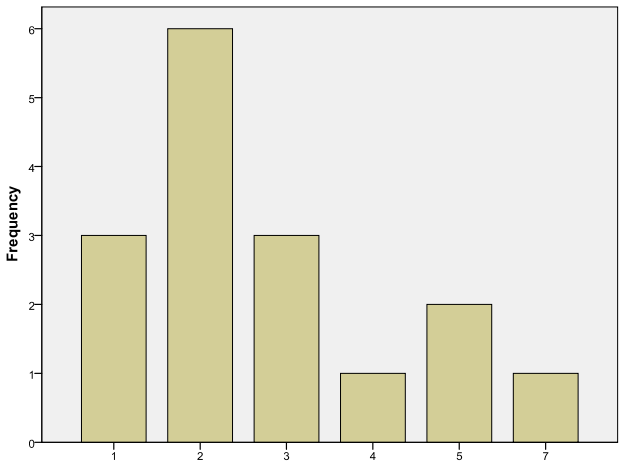
Mother’s rejecting mother



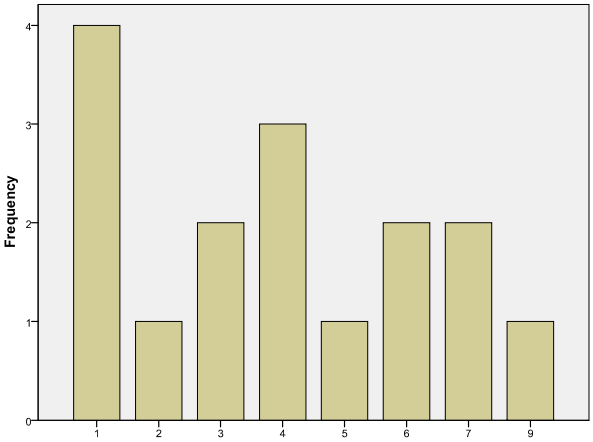
Offspring’s rejecting mother



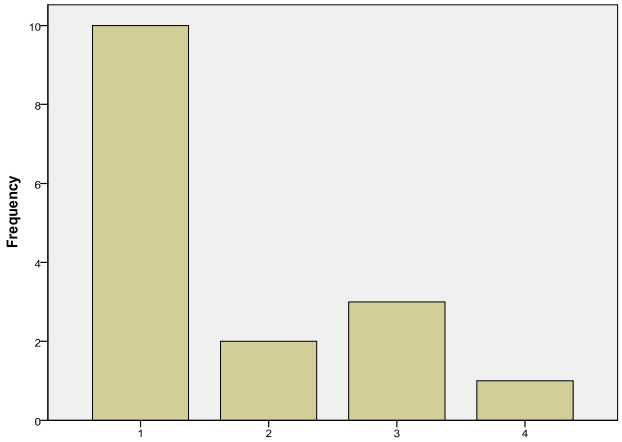
Mother's rejecting father



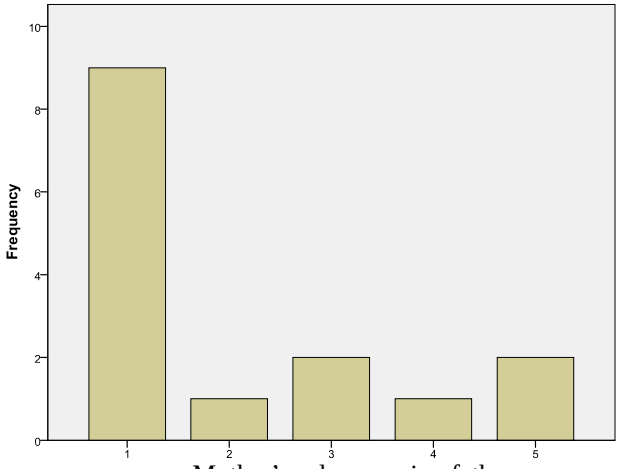
Offspring's rejecting father



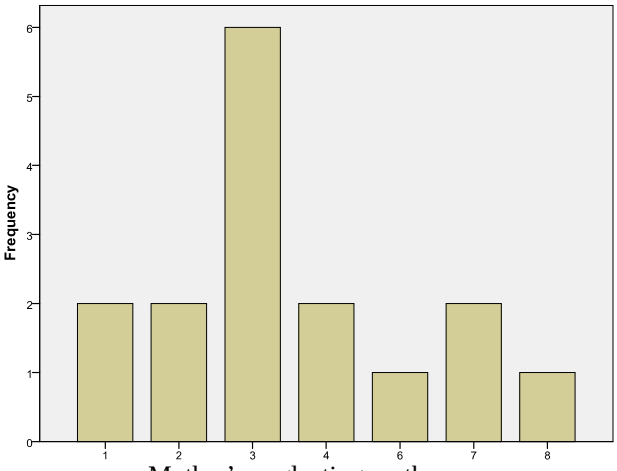
Mother's role reversing mother



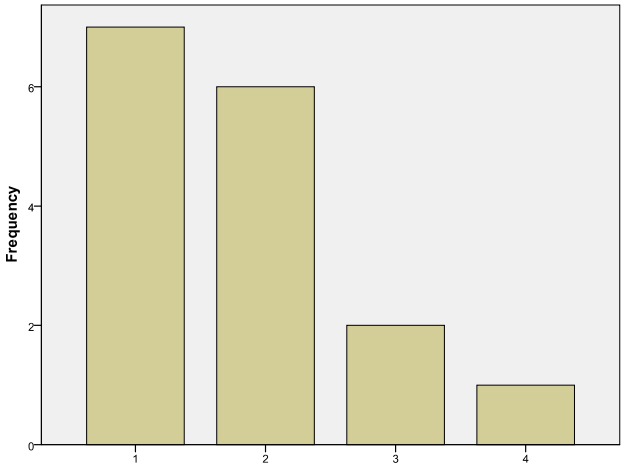
Offspring's role reversing mother



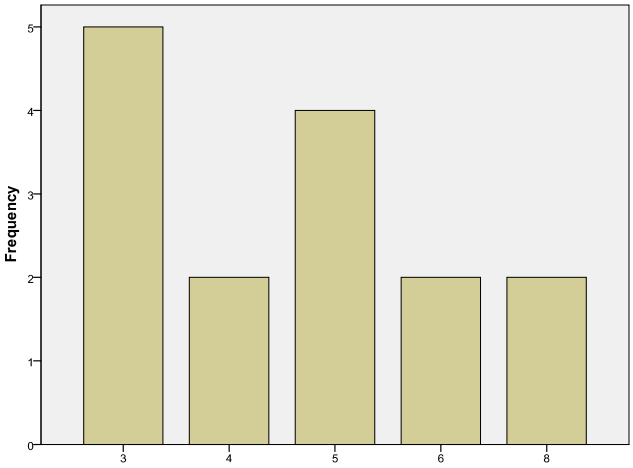
Mother's role reversing father



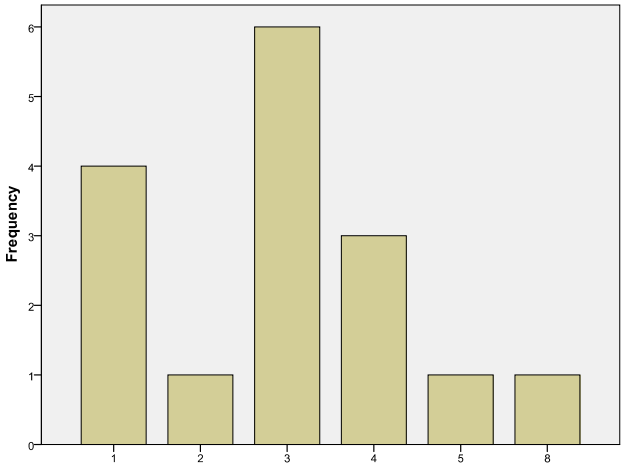
Mother's neglecting mother



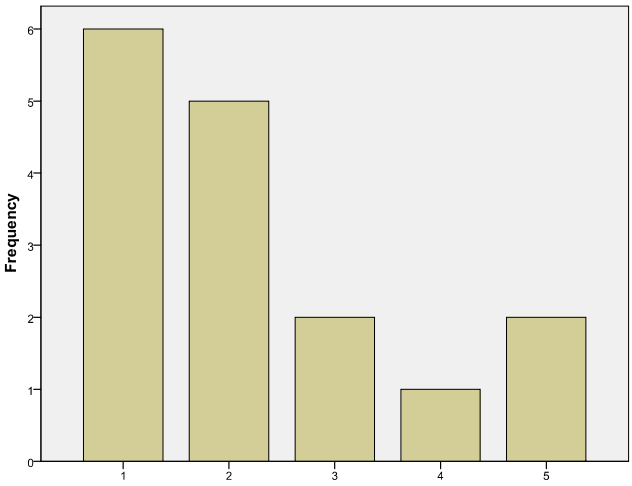
Offspring's neglecting mother



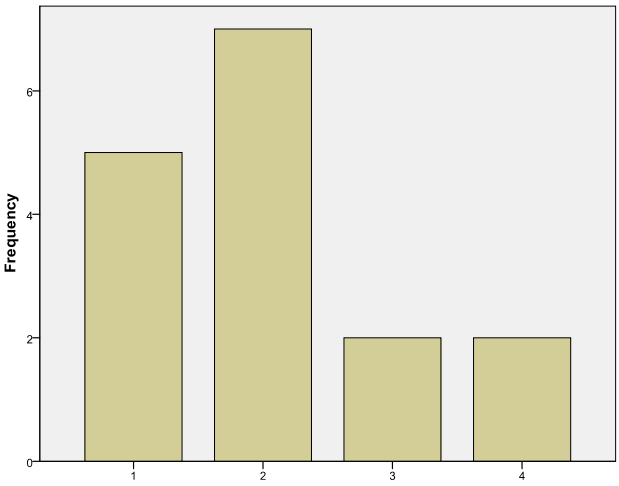
Mother's neglecting father



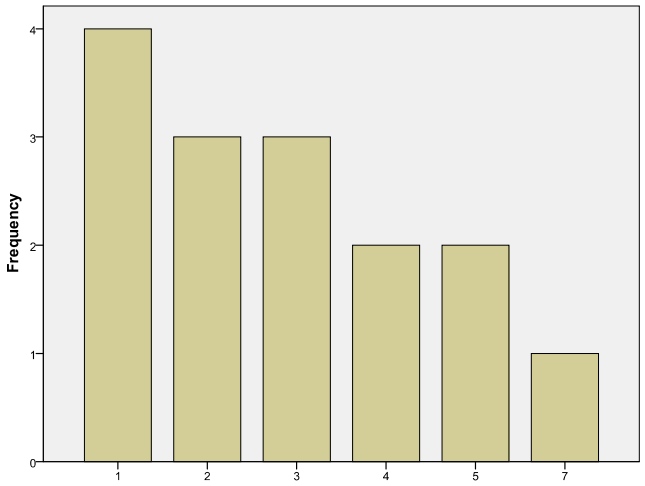
Offspring's neglecting father



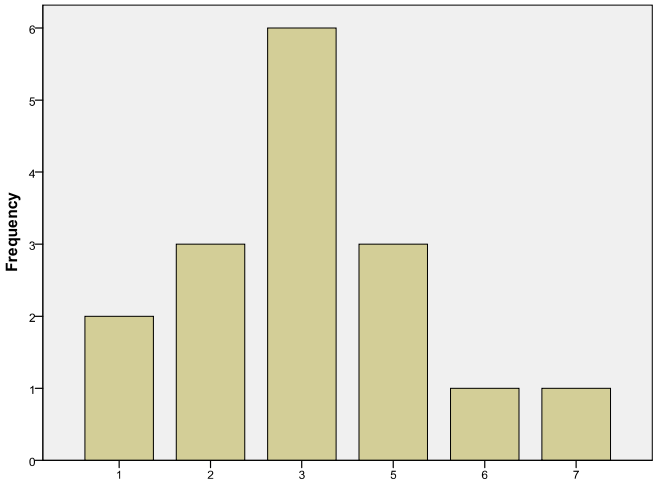
Mother's pressuring to achieve mother



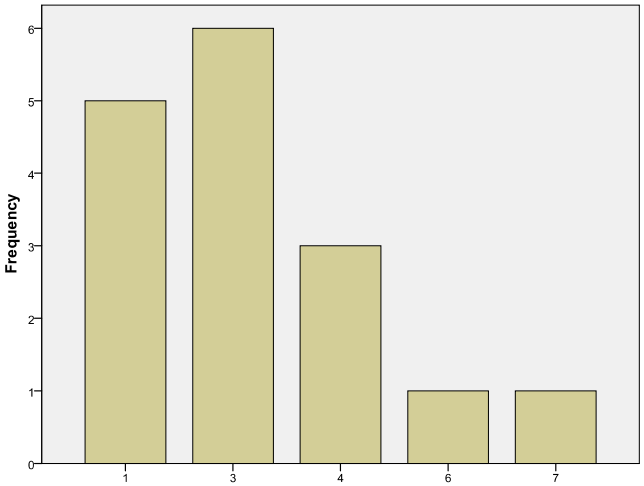
Offspring's pressuring to achieve mother



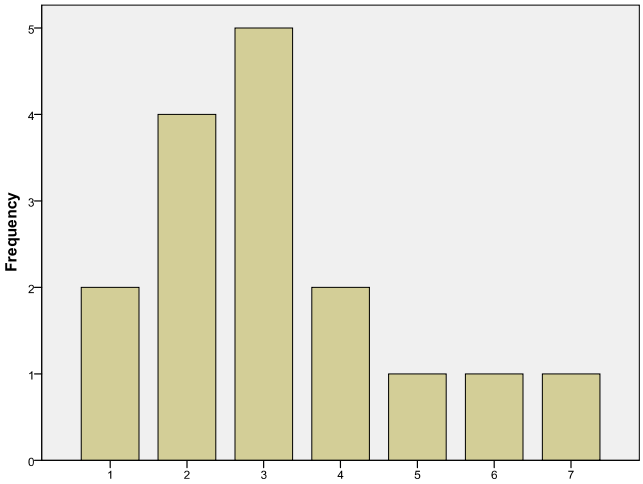
Mother’s pressuring to achieve father



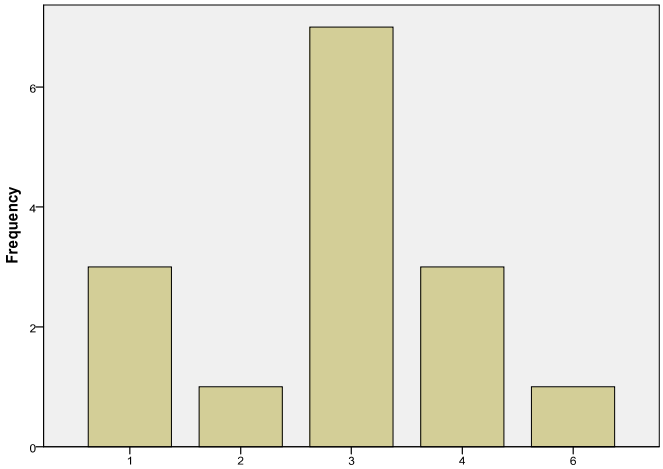
Offspring’s pressuring to achieve father



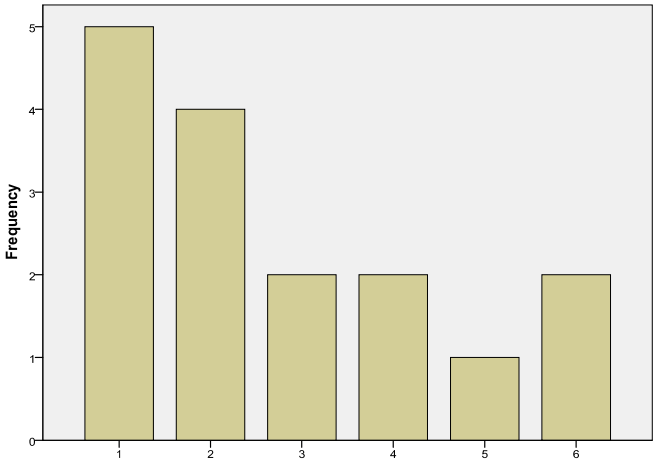
Mother’s idealization of mother



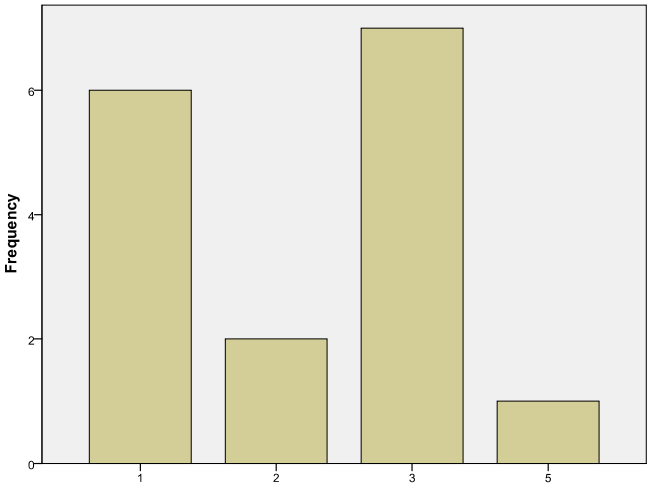
Offspring’s idealization of mother



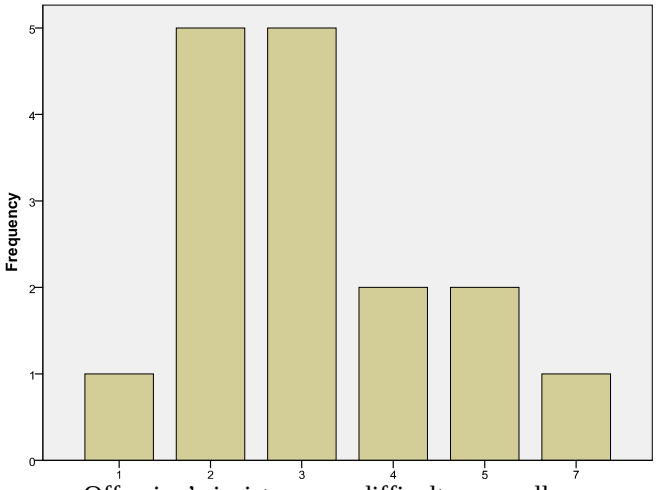
Mother’s idealization of father



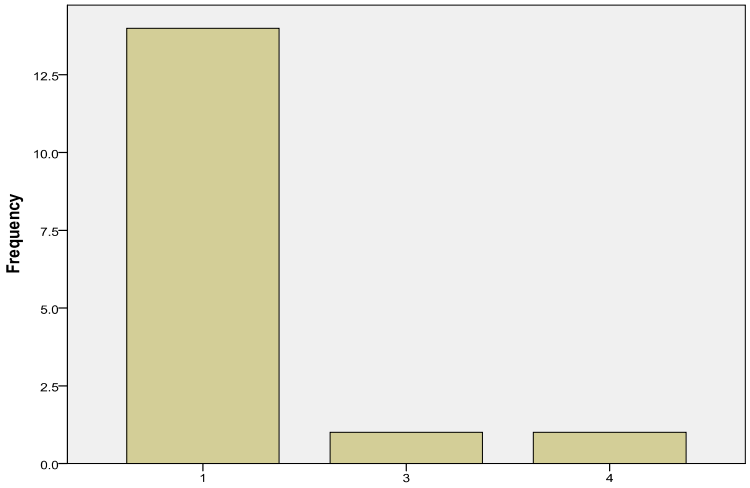
Offspring’s idealization of father



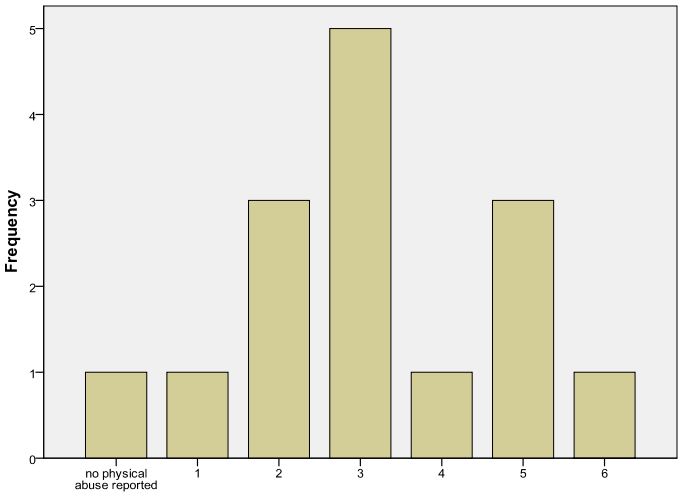
Mother's insistence on difficulty w recall



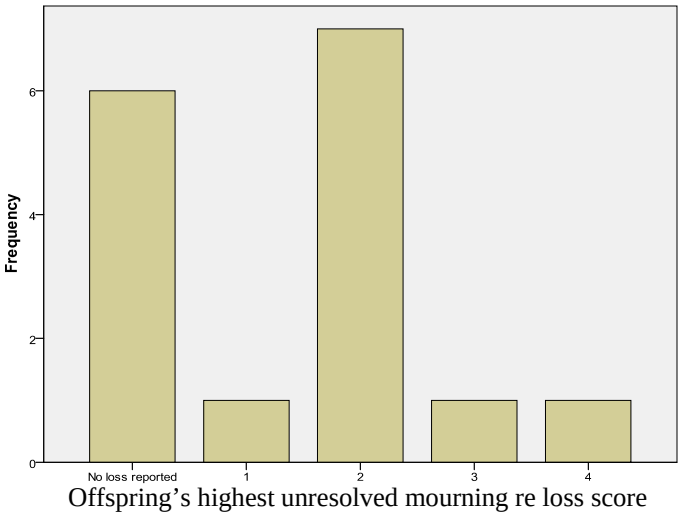
Offspring's insistence on difficulty w recall



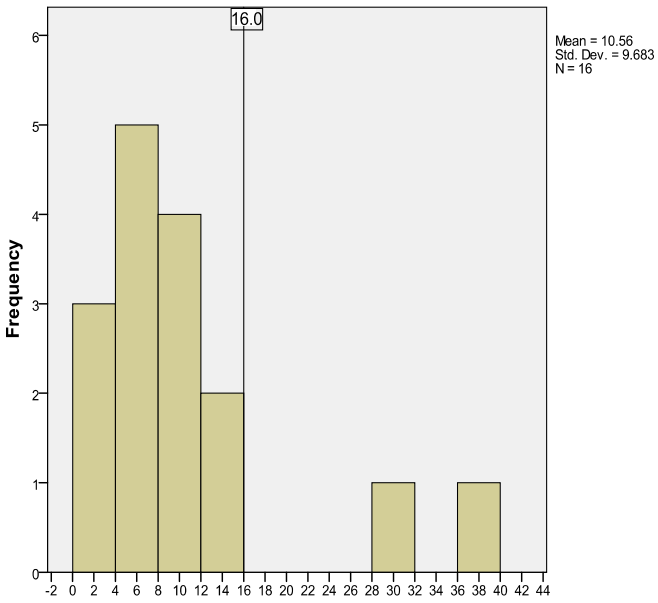
Mother's fear of loss of child



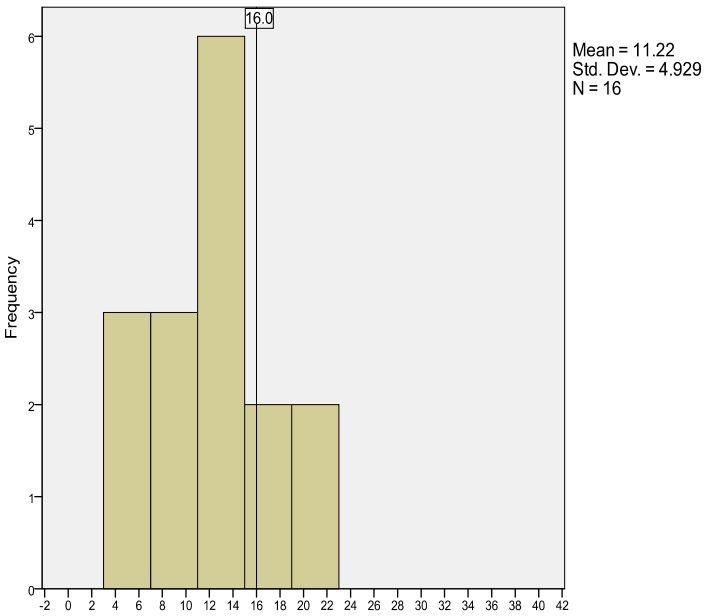
Mother's highest unresolved mourning re loss score



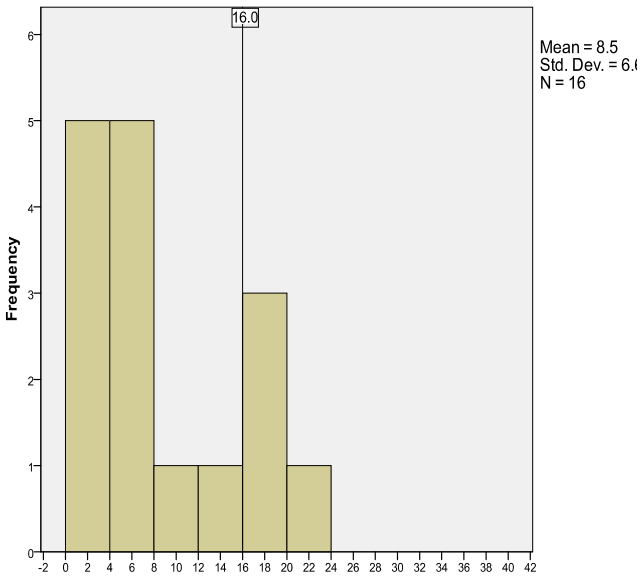
Offspring's highest unresolved mourning re loss score



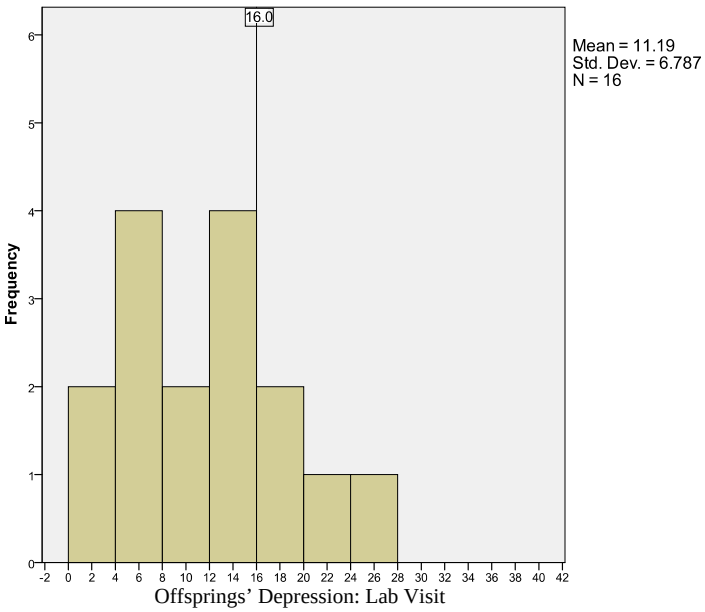
Mothers' Depression: Telephone



Offsprings' Depression: Telephone

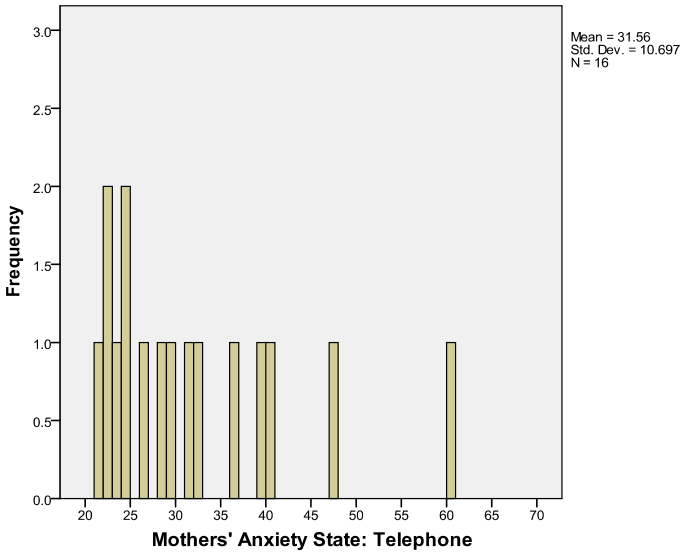


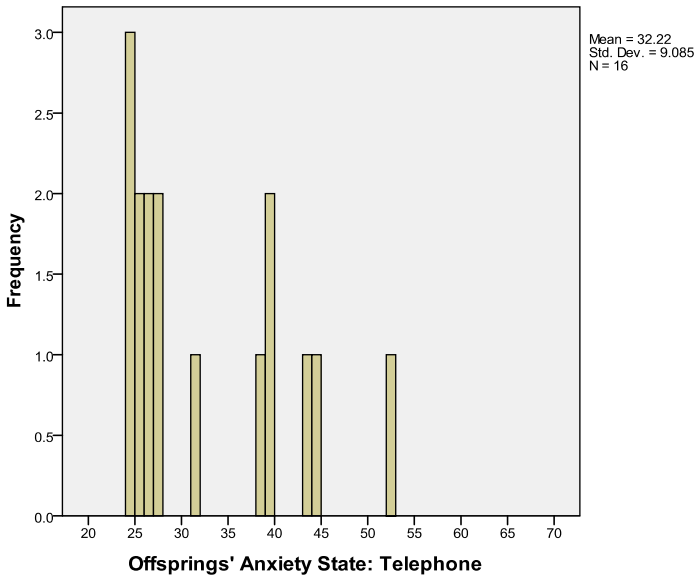
Mothers' Depression: Lab Visit

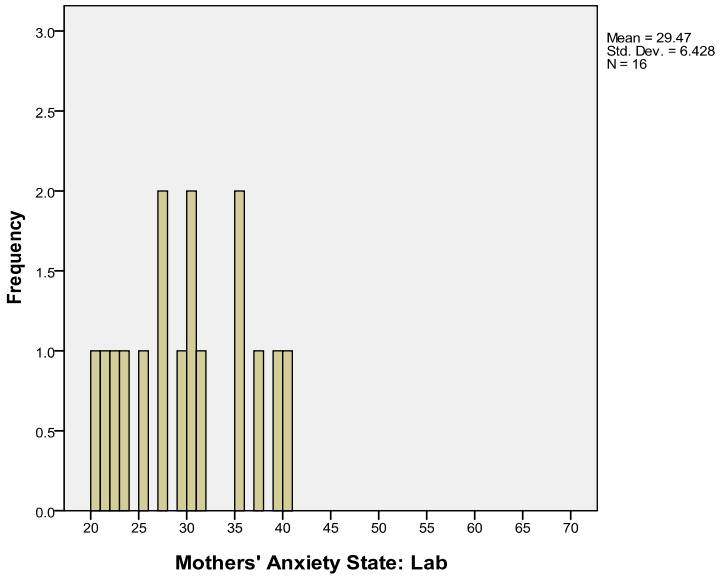


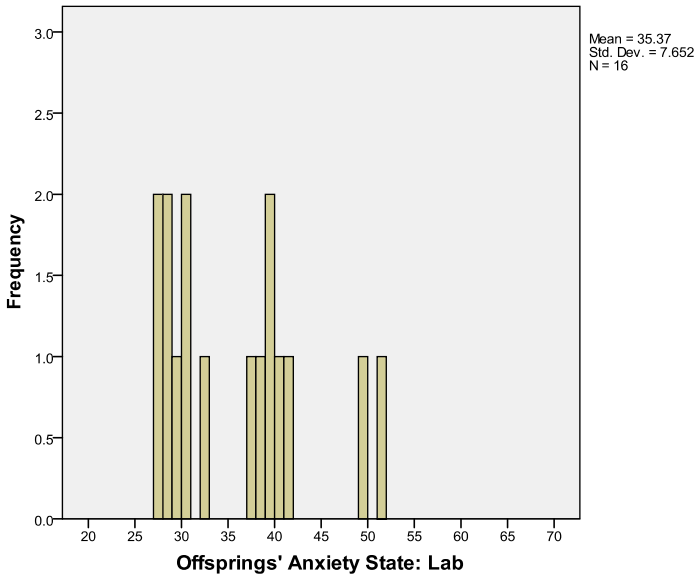
Offsprings' Depression: Lab Visit

Appendix B2. Histograms of Depression (CES-D): Mother and Offspring

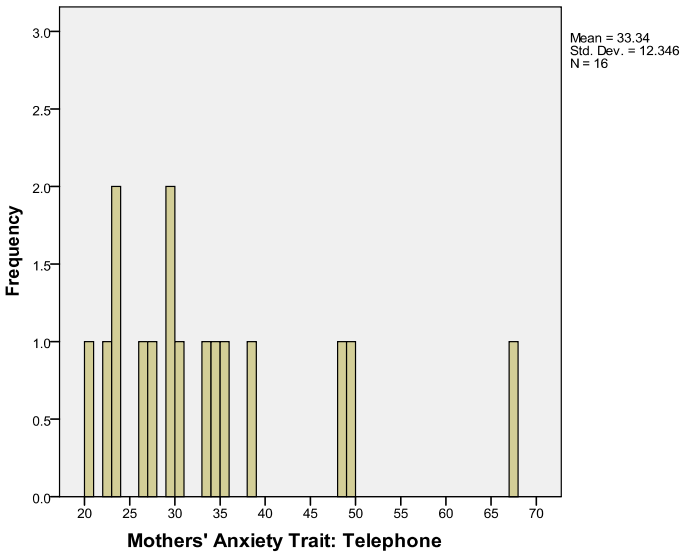


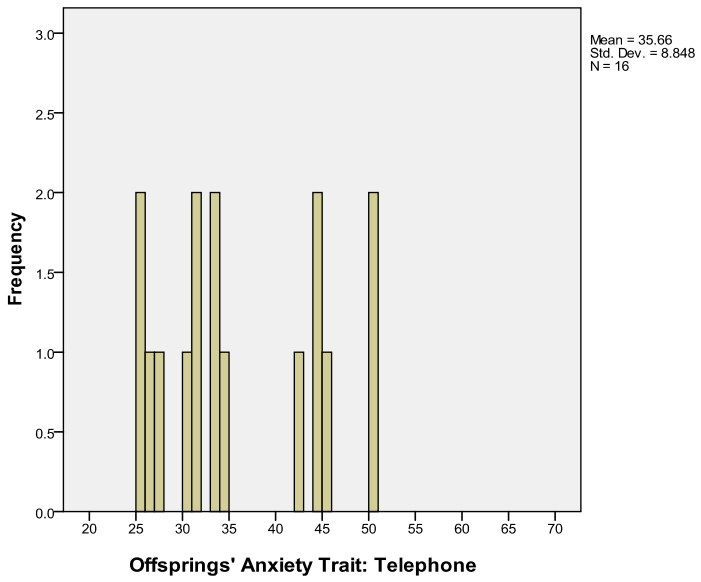


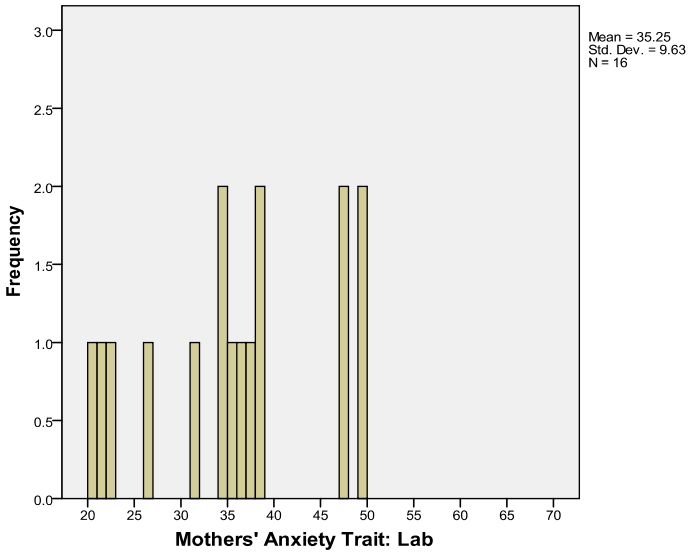


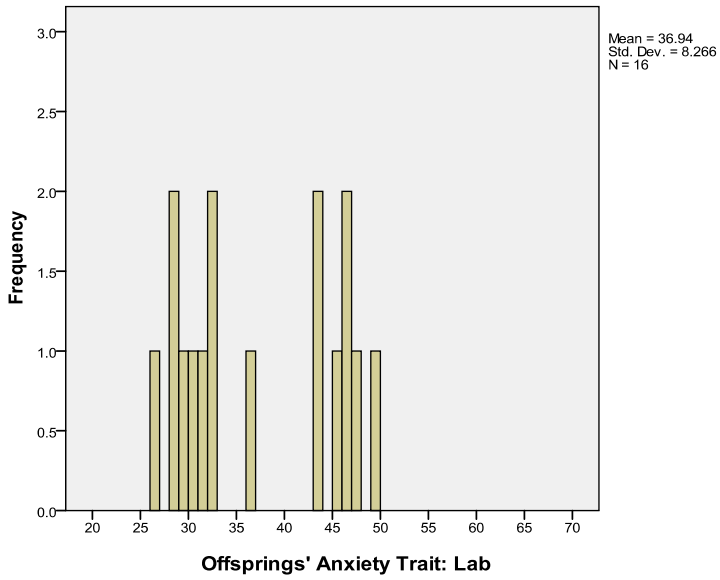


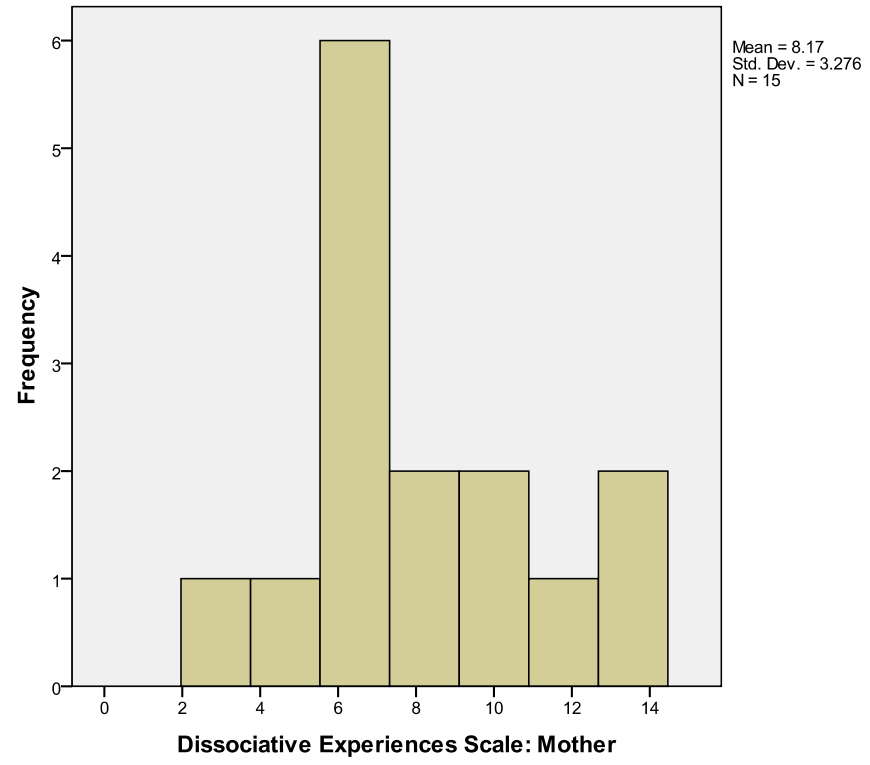
Appendix B3. Histograms of Anxiety (Spielberger Anxiety State): Mother and Offspring

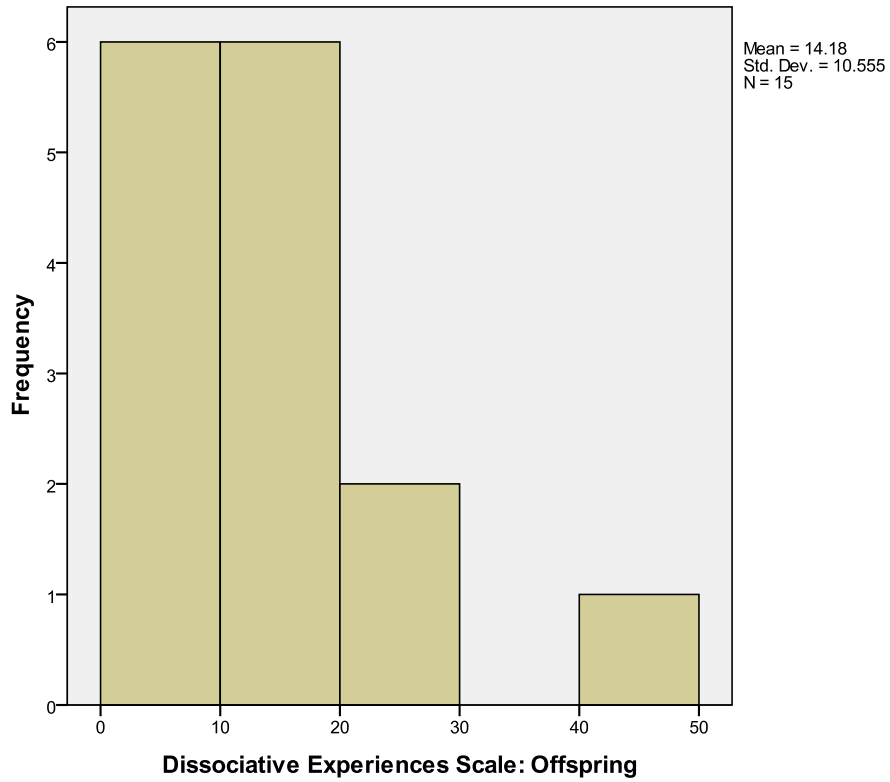

Mean = 33.34
Std. Dev. = 12.346
N = 16
Frequency
Mothers' Anxiety Trait: Telephone


Mean = 35.66
Std. Dev. = 8.848
N = 16
Frequency
Offsprings' Anxiety Trait: Telephone


Mean = 35.25
Std. Dev. = 9.63
N = 16
Frequency
Mothers' Anxiety Trait: Lab


Mean = 36.94
Std. Dev. = 8.266
N = 16
Frequency
Offsprings' Anxiety Trait: Lab





Appendix B4. Histograms of Dissociative Experiences (DES): Mother and Offspring