

Effectiveness of Teaching an Early Parenting Approach Within a Community-Based Support Service for Adolescent Mothers

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Abstract: A single blind, pre-test, post-test design was used to test the effectiveness of the Keys to Caregiving Program in enhancing adolescent mother–infant interactions. Participants were sequentially allocated to groups in order of referral. The outcome was the enhancement of maternal and infant behaviors that exhibited mutual responsiveness as measured by the Nursing Child Assessment Teaching Scale. Issues with recruitment and collaboration with the community agencies made achieving a desirable sample size difficult. Pre-tests and post-tests were completed for 13 participants. While the sample size was insufficient to confidently establish whether or not the Keys to Caregiving produced a between groups treatment effect, mothers within the treatment group evidenced significantly greater contingent responsiveness over time than those within the control group. © 2007 Wiley Periodicals, Inc. *Res Nurs Health* 31:12–22, 2008

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Parenting interactions that promote growth and development in infants are characterized by mutual warmth, sensitivity, and responsiveness (Barnard, 1997; Sumner & Spietz, 1994). Such interactions require that the parent and the infant

carry out certain responsibilities. Infants are responsible for sending clear cues concerning their internal states, communicating their needs for care, and for being responsive to the parent. Parents must recognize and respond to their

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infants' cues, alleviate their distress, and provide opportunities for growth and development. A pattern of contingent responsiveness is set up as each individual positively responds to the other in interactions.

The social conditions and developmental tasks of adolescent motherhood provide challenges for the achievement of maternal contingent responsiveness to their infants. Many community-based programs have been implemented to overcome these social barriers. In the study presented here, the researchers and staff from a community-based agency tested the effect of adding direct teaching of parenting skills to the social support already offered in three adolescent support programs. Direct teaching of parenting differs from social support in that its primary purpose is to instruct parents on ways of interacting with and promoting the development of their children. Although direct teaching of parenting skill may provide encouragement and support to parents, that is not its primary purpose (Mahoney et al., 1999).

ADOLESCENT PARENTING

Compared to older mothers, adolescent mothers are characterized as less sensitive to infant cues, more unrealistic about their expectations for infant behavior, less verbal with and responsive toward their infants, more impatient, and more prone to use physical punishment (Barnard, 1997; Ruff, 1987; Sumner & Spietz, 1994; von Windeguth & Urbano, 1989). The social stresses of normal development during adolescence in combination with the transition to parenthood are likely to interfere with adolescent mothers' abilities to recognize and contingently respond to their infants' cues. Adolescent mothers are more likely to: fail to continue their education (Hoffman, Foster, & Furstenberg, 1993; Holtz, McIlroy, & Sanders, 1997; Moore, Morrison, & Greene, 1997); be unemployed, underemployed, or work in unskilled jobs (Wilson, 1996) and therefore have low incomes; react to conflicting demands of adolescence and parenthood with depressive symptomatology (Carter, Osofsky, & Hann, 1991; Wasserman, Brunelli, & Rauh, 1990); parent alone (Furstenberg, Brooks-Gunn, & Morgan, 1987; Hayes, 1987; Holtz et al.; Moore et al.); and experience more childbearing health problems including less healthy babies (Klerman, 1993; Scholl, Hediger, & Belsky, 1994). Social support accompanied by parent education may be required to overcome many of these barriers to maternal awareness and contingent responsiveness.

SOCIAL SUPPORT PROGRAMMING

Although adolescent mothers may receive support from a wide variety of sources including their family (e.g., mothers, grandmothers, sisters, cousins), peers (e.g., friends, other mothers), professionals (e.g., teachers, social workers), and other support network members such as partners and fathers of the infant, many adolescent mothers report an ambivalent or negative relationship with network members (Bunting & McAuley, 2004; Logson, Gagne, Hughes, Patterson, & Rakestraw, 2005; Sadler et al., 2007). Moreover, adolescents report losing network members after they become mothers, precisely when they are most in need of support (Logson et al.; Sadler et al.). To meet these additional needs, community-based support programs have been developed that are tailored for adolescent mothers. Some programs focus on specific aspects of adolescent mothers' support needs such as parent–infant interaction training or child care provision, while others focus on providing comprehensive services with multiple components (e.g., stress management, parenting skills development, fostering self-sufficiency, promoting supportive interactions with network members; see Letourneau, Stewart, & Barnfather, 2004 for a full review). Social support programs for adolescent mothers have been linked to improved: adolescent mother–child interaction quality, parenting competence and confidence in providing infant care (Letourneau et al.; Ruchala & James, 1997; Sadler et al.; Shapiro & Mangelsdorf, 1994). Evaluation and testing of community-based social support programming for adolescent parents is limited (Letourneau et al.) and should become a focus of partnerships between community agencies and researchers committed to studying the delivery of relevant services to adolescent mothers.

The goal of this research was to produce clinically useful knowledge (Lonigan, Elbert, & Johnson, 1998; Weisz, Donenberg, Han, & Weiss, 1995) about one early parenting approach designed to improve parent–infant contingency. We chose to examine the effectiveness of the approach, as opposed to its efficacy (Brown, 2002). In efficacy studies, approaches are tested for the potential to produce the desired outcomes through exertion of tight control over potential contextual influences. In our study, effectiveness was the focus as the parenting approach was tested within the realities of three community-based social support programs in a western Canadian city that provide multiple services to adolescent mothers.

METHODS

Design

A single blind, pre-test, post-test, quasi-randomized trial with one intervention and one control group was conducted within a community-based social support agency for adolescent mothers. Quasi-randomization was achieved through assignment to intervention or control group sequentially as the participant was recruited (e.g., first participant was assigned to the intervention group and second to the control and so on) by the research project director.

Study Participants and Recruitment

Pregnant or parenting teen mothers were recruited through a community agency that responds to the issues and challenges of teen pregnancy through casework services and the management of three support programs for adolescent parents. Two of the programs provide prenatal classes and labor support, childcare, parenting support and education, home visiting, crisis intervention, referral and assessment, and housing support services. The third program for pregnant and parenting teens provides services to students enrolled in the school system. In this program, students can access the services at five school sites from the end of September to the beginning of June. Group activities provide a source of socialization and support for the teen mothers as well as education in various topics pertaining to teen parenting. Although mothers in the study had access to multiple services related to adolescent parenting, social support, and high school curriculum, none of these services focused on knowing about infant cues and enhancing maternal–infant contingent responsiveness.

Inclusion criteria for the study were: (a) first time mothers between 13 and 19 years of age; (b) uneventful pregnancy, birth, and postpartum recovery; (c) willing to engage in parenting education; and (d) able to read and write English and to sign the consent form. In Canada, parental consent for a minor's participation in research is not required if the minor demonstrates the ability to provide informed consent. For adolescents under the age of 16, there was a research plan for written parental consent. No participants referred to the study by the community agency were under 16, and all were judged by their caseworker to have life circumstances stable enough to benefit from participation in parenting education. Infants

of the participants were judged to be healthy if they met the following criteria: (a) singleton birth of 36–41 weeks gestation; (b) birth weight equal to or greater than 2,500 g; (c) no apparent congenital anomalies; and (d) no admission to the neonatal intensive care unit.

Recruitment of adolescents for research studies presents unique challenges (Lamb, Puskar, & Tusaie-Mumford, 2001). Their developmental status must be taken into consideration. When explaining research to adolescent subjects, a clear understanding of the study is essential for informed consent, generating interest, and cooperation. The community agency casework supervisor and caseworkers reviewed each new client's suitability for the research project on intake. Clients judged to have stable life circumstances and able to learn from the direct teaching of parenting skills were approached by their caseworker with information about the study during the prenatal period or shortly after delivery.

Developing a collaborative relationship between the research team and agency personnel increases the agency's commitment to the research project, and use of a consistent contact person improves communication (Lamb et al., 2001). We agreed that the agency's senior manager and the researchers' project director would liaise for purposes of research project management. The agency's senior manager maintained a record of those clients who agreed to participate and forwarded the client information to the research project director. This arrangement was one of many ways that clear consistent communication between the agency and the research project, was facilitated. Prior to the commencement of the project, research personnel met with agency supervisors and caseworkers to explain the research project and answer questions. A written summary of the project including inclusion criteria was provided. Research team members met with staff every few months to discuss recruitment and any other issues that may have arisen. The research director maintained frequent communication with the senior manager.

Once the referral information was received, the research project director telephoned the potential participants and explained the study fully. After a verbal assent was obtained, the participant was assigned to either the intervention or control group. Enrolled mothers were then visited in their homes by the interventionist and the agency caseworker together. On subsequent visits the caseworker was not present, except for one participant whose living situation was considered potentially unsafe for the interventionist to visit

alone. The initial visit provided the adolescent mother and the interventionist an opportunity to become acquainted and to begin to develop a trusting relationship. Heinicke et al. (2000) observed that developing a positive connection between mother and interventionist, and building maternal trust are important factors that influence outcomes in interventions with at-risk mothers.

Interventions

Two interventions were added to the usual support that the participants were receiving through the community support agency. The intervention group received a brief social support intervention and direct teaching of the Keys to Caregiving Program. In order to control for the lack of a visit, the comparison group received brief social support only. There was no attempt to make the intervention visits equal in length to the comparison group visits.

Keys to Caregiving Program. The Keys to Caregiving Program (Nursing Child Assessment Satellite Training [NCAST], 1990) was used to teach parenting knowledge and skill. This program provides a systematic approach to teaching parents sensitivity to their infant cues and help to establish contingent responsiveness. When implemented by a health professional, the program is designed to gradually introduce parents to five concepts that provide the parent with resources necessary for high-quality interactions with their infants. Parents learn about (a) infant states; (b) infant behaviors; (c) infant cues; (d) how to modulate states; and (e) how to interact during feeding. The program lessons were delivered in combination with a brief social support intervention.

During each of five home visits, with visits spaced every 2–3 weeks, participants were provided with a Keys to Caregiving pamphlet that related to one of the five program topics. The parent and interventionist discussed the concepts in the pamphlets and applied them to the adolescents' infants. A video was shown of babies exhibiting behaviors the same as and different from those observed in the adolescent's new infant. Mothers were encouraged to relate examples of the behaviors discussed to their everyday understanding of their own infants. As mothers proceeded through the intervention program and continued to build on their knowledge, they learned when and how to interact with their infants in optimal ways.

A pilot study of the Keys to Caregiving Program, designed as a post-test only randomized controlled trial, had previously been delivered by a doctoral student to adolescent mothers recruited directly from postpartum nursing units. The results of this study showed that the Keys to Caregiving Program had the potential to enhance adolescent mothers' sensitivity and responsiveness (Letourneau, 2001). The pilot data also indicated that social support needed to be provided prior to the direct teaching of parenting knowledge and skill. Examples of social support provided in the pilot included answering questions about postpartum or infant health, referrals to food banks or social services, and discussion of relationship difficulties.

Brief social support. The social support provided by the community-based programs was augmented in both the intervention group and the comparison group. This additional support provided control for a visitation effect in the control group and social support to prime the Keys to Caregiving Program in the intervention group. During the home visits, brief social support consisted of incidental information (e.g., baby care), affirmation (e.g., validation feedback), emotional support (e.g., listening; Stewart, 1993), and referral to the caseworker from the three community-based social support programs when more substantial needs arose during the research intervention visit.

Interventionist selection, training, and supervision. Because this was an effectiveness trial, we initially planned that the staff of the community-based agency staff would deliver the Keys to Caregiving Program and brief social support under supervision of the research team. Agency logistics and study budgetary constraints precluded this approach. Instead the research team, in consultation with the agency, hired an interventionist with credentials and experience that matched the caseworkers employed by the agency. A second interventionist was hired near the end of the study to cover for the first interventionist's maternity leave. The interventionist and the participant's caseworker made the initial recruitment visit together and communicated regularly in order to retain the participants in the study and to deliver any service required beyond the brief social support.

Both interventionists received 24 hours of training. Following a half day introductory session, the interventionists were provided 10 hours of self-study to learn the Keys to Caregiving Program. The Keys to Caregiving videos each cover a topic in the program and can be used for self-study in

conjunction with the Keys to Caregiving manual. A follow-up session was held during which the interventionist practiced delivering the Keys to Caregiving intervention and learned protocols for safety, health, referrals, and videotaping. Ongoing training was incorporated into twice monthly reflective supervision debriefing sessions with members of the research team to review the interventionists' contact sheets and field notes and to discuss any concerns or issues arising from visits with the participants or contacts with the agency caseworkers.

Measurement

Measures were selected to determine equivalency of groups and to assess the benefit of the intervention. Education level, income category, the Edinburgh Postnatal Depression Scale (Cox, Holden, & Sagovsky, 1987), and the Difficult Life Circumstances Scale (Johnson, Booth, & Barnard, 1989) were used to assess equivalency of groups. The Contingency Subscale of the Nursing Child Assessment Teaching Scale (NCATS; Sumner & Spietz, 1994), an observational measure of parent–infant interaction, was used to determine effectiveness of the implementation of the Keys to Caregiving.

Edinburgh postnatal depression scale. Ten to 15% of women suffer from postpartum depression (O'Hara, Neunaber, & Zekoski, 1984), which can negatively influence mother–infant interactions (Beck 1995; Kaplan, Bachorowski, & Zarlengo-Strouse, 1999; Lesser, Koniak-Griffin, & Anderson, 1999). The Edinburgh Postnatal Depression Scale (EDPS) was used to assess for the presence of depression in the mothers. The scale has 10 items that produce a range of scores from 0 to 30, with a higher score indicating more symptoms. A score of ≥ 12 has been strongly associated with depressive illness of varying severity (Cox et al., 1987).

Difficult life circumstances scale. Stressful life situations, including poverty, have also been found to interfere with optimal parent–infant interactions (Jones et al., 2002). The Difficult Life Circumstances Scale (DLC; Johnson et al., 1989) was used to capture the magnitude of stressors or chronic problems experienced by the participants. This measure is a 28-item binary scale where a score of 6 or more affirmative answers indicates risk for poor parenting and child outcomes. Test-retest correlations range from .40 to .70. Construct validity correlations ranges from .20 to .59 with maternal depression scales, family social support

inventories, negative maternal physical symptoms, infant development indexes, and problem child behavior inventories.

Nursing child assessment teaching scale (NCATS) contingency subscale. As the focus of this research was to enhance maternal–infant contingent responses, the NCATS Contingency Subscale was selected as the primary outcome measure. Structured mother–infant play episodes at baseline and post-intervention were videotaped by the interventionist using a standardized protocol. NCATS (Sumner & Spietz, 1994), a widely used measure of parent–infant interaction (Barnard, 1997; Drummond et al., 1999), was used to code play interactions by the research project director who had 90% reliability with NCATS training test video tapes. The research project director, who had never met the mothers and infants and could not identify them, coded all of the post-test videos at the end of the study.

The NCATS consists of 76 maternal and 23 infant behavioral items designed to assess the contributions of each to the social interaction. The Contingency Subscale consists of 32 of the total NCATS items and is embedded in five of the other subscales rather than standing on its own. The Contingency Subscale measures behaviors that suggest a contingent pattern of communication. For example, if one partner in the interaction vocalizes, the other partner turns to listen. When a caregiver responds immediately to a child, the child learns to connect the caregiver response to her or his behaviors. A contingent communication pattern provides a mechanism by which a child begins to understand the relationship between behavior and environment, which builds security (Sumner & Spietz, 1994). A contingent caregiver tends to score high on Teaching Scale items, which are scattered throughout the subscales. Example of items include: (a) Caregiver gives instruction only when the child is attentive (90% of the time) in Subscale 1; (b) Caregiver makes soothing non-verbal responses (e.g., pat, touch, rock, caress, kiss in Subscale 2); (c) Caregiver smiles, or touches child within 5 seconds after the child smiles or vocalizes in Subscale 3, (d) Caregiver verbally praises the child after child has performed better or more successfully than the last attempt in Subscale 4; and (e) Child vocalize or babbles within 5 seconds of caregiver's verbalization in Subscale 6.

Procedures

The study took place over a 16-month period from September 2004 to December 2005. Recruitment,

intervention and measurement took place over eight home visits that began as soon as possible postpartum, up to a maximum of 2 months of age. Completion of the intervention was targeted at 12 weeks postpartum, but because of cancelled visits and delays in scheduling visits due to the adolescent mother's life events and priorities, visits were completed between 3 and 5 months of age. During the first home visit, the participant's caseworker and the interventionist visited the participant together. The study was re-explained, the working relationship between the interventionist and the caseworker was established, the interventionist had an opportunity to begin developing rapport with the adolescent mother, and the consent for participation was signed. Baseline data was collected during the second home visit. The intervention and control procedures were delivered during the third to seventh home visits. Post-test measurement and exit interviews occurred during the last home visit.

Data Analysis

Descriptions of participants were developed using summary statistics as appropriate. Equivalency of groups was established through analysis of variance. Correlations between the pre-test NCATS Contingency Subscale scores and the demographic and baseline measures were also explored. Repeated measures analysis of variance using SPSS 14.0 (2005) was used to determine the effectiveness of the intervention. Using GPOWER (Faul & Erdfelder, 1992), an effect size of .50 based on Letourneau's (2001) pilot data and an alpha .05 would require a sample size of 17 per group for 0.8 power to find a between-subjects effect and a sample size of 12 to find a within-subject effect.

To assess for the potential confounding influence of maternal age, highest level of education obtained, and the baseline measures of the Difficult Life Circumstances Scale and the Edinburgh Postnatal Depression Scale, we first correlated each potential confounder with the difference between the post-test and pre-test NCAST Contingency scores, separately for the controls and for the intervention group. Next, we used multi-variable linear regression modeling to compare the change in the estimate of the treatment parameter (coded as a dummy variable: 1 = *intervention* group and 0 = *control* group) with and without the confounder. Variables were considered confounders if they altered the treatment parameter estimate by 10–15% regardless of statistical significance.

RESULTS

Participants

The community caseworker judgment and interaction with potential participants played a large role in recruitment to the study. Of 118 clients from the three programs that met the inclusion criteria, 81 adolescents were approached by their caseworker for participation. Of these, 25 were referred to the study, 20 were enrolled, and 15 completed the study. Thus, 21% of the target population was recruited, which is twice the frequently quoted average of 10% (Hunninghake, Darby, & Probstfield, 1987; Leventhal, Nerenz, Leventhal, Love, & Bendena, 1991), and 75% of those enrolled were retained. These final numbers limited our ability to draw between-group conclusions.

Reasons given for non-participation were: not enough time; too many people/workers already involved; and too much crisis in life at the present time. Prior to beginning the study, three adolescents changed their minds about participating, and the interventionist was unable to arrange a visit with another two adolescent mothers before their infants reached 2 months of age. Five participants (three from the intervention group and two from the control group) withdrew after the intervention began. Of these, two adolescents had their infants placed for adoption, one adolescent moved away from the area, and two adolescents experienced new crises and felt unable to make time to complete the study.

Demographics and Group Equivalency

Of the 15 participants who completed the study, one in the control group did not complete the NCATS pre-test, and one in the intervention group did not complete the post-test. This left 13 young mothers with pre- and post-test data for the final analysis. Table 1 contains a summary of the participant demographics and baseline measures for those with complete data. Due to the small sample size, group equivalency data should be interpreted cautiously. There were no significant differences between the intervention or control groups on maternal age, highest grade level achieved, the Edinburgh Postnatal Depression Scale, the Difficult Life Circumstances Scale, and the pre-test NCATS Contingency Subscale. For the whole sample, there were no significant correlations among the demographic variables,

Table 1. Demographic and Baseline Measure Results

Group	Treatment (<i>n</i> = 6)	Control (<i>n</i> = 7)	Total (<i>n</i> = 13)
Age in years			
Mean (range)	18.0 (16.7–19.7)	18.5 (17.3–19.6)	18.3 (16.7–19.7)
Standard deviation	1.1	.9	1.0
Highest grade of education			
Mean (range)	10.0 (9–11)	10.6 (9–12)	10.3 (9–12)
Standard deviation	.9	1.0	.9
Difficult life circumstances			
Mean (range)	5.0 (1–8)	4.1 (0–6)	4.5 (0–8)
Standard deviation	3.2	2.3	4.5
Edinburgh postnatal depression			
Mean (range)	7.3 (2–20)	7.7 (2–12)	7.6 (2–20)
Standard deviation	6.7	3.3	4.9

the Edinburgh Postnatal Depression Scale, the Difficult Life Circumstances Scale and the pre-test NCATS Contingency Subscale.

Effectiveness in Enhancing Contingent Responsiveness

The pre-test and post-test NCATS Contingency Subscale scores for the intervention and control groups are shown in Figure 1 (A, B). As shown in Table 2, repeated measures analysis of variance of the NCATS Contingency Subscale revealed that overall the mother–infant dyads in both the intervention and control groups became significantly ($p < .05$) more contingently responsive over time. However, the participants in the intervention group showed a significantly ($p < .05$) greater increase, thus exhibiting an interaction of the between-group and within-subject effect. However, a between-group effect (difference between group means) was not shown, and the study was underpowered to draw conclusions from this result.

Normative data for the Contingency Subscale on 210 adolescent mothers with low education under the age of 20 are available for adolescent mothers with low education from the NCATS Database (Sumner & Spietz, 1994). These normative NCATS Contingency Subscale scores had a

mean of 20.6; range from 7 to 31; and a standard deviation of 5.9. Our team believed that a clinically important increase in a community-based setting would be half a standard deviation (Guralnick, 1997). Although this study was underpowered to find a between-group effect, compared to the normative data, our data suggest over a full standard deviation improvement in the treatment group mean post-test scores compared to the baseline scores.

Assessment of Confounders

In the control group, the pre-test NCATS Contingency Subscale and the Difficult Life Circumstances Scale were correlated ($r = .80$, $p = .03$). In the intervention group the pre-test NCATS Contingency Subscale and the Edinburgh Postnatal Depression Scale were correlated ($r = .87$, $p = .03$). This finding is likely due to the fact that only one participant scored as being at risk for depression (EDPS score = 20) and she was allocated to the intervention group.

When the differences between the pre-test and post-test contingency scores were correlated with baseline measures the following resulted: Difficult Life Circumstances showed negative correlations in both the intervention ($r = -.89$, $p = .02$) and control groups ($r = -.77$, $p = .05$); the Edinburgh

Table 2. Results for Contingent Responsiveness Subscale of the NCATS

	Mean (<i>SD</i>)		Effect <i>F</i> (<i>p</i>)		
	Pre-test	Post-test	Within-subject	Within-subject × group	Between-groups
Treatment (<i>n</i> = 6)	14.83 (2.40)	23.67 (2.88)			
Control (<i>n</i> = 7)	15.86 (7.38)	16.71 (5.61)			
Total (<i>n</i> = 13)	15.38 (5.47)	19.92 (5.68)	7.73 (.02)	5.24 (.04)	1.69 (.22)

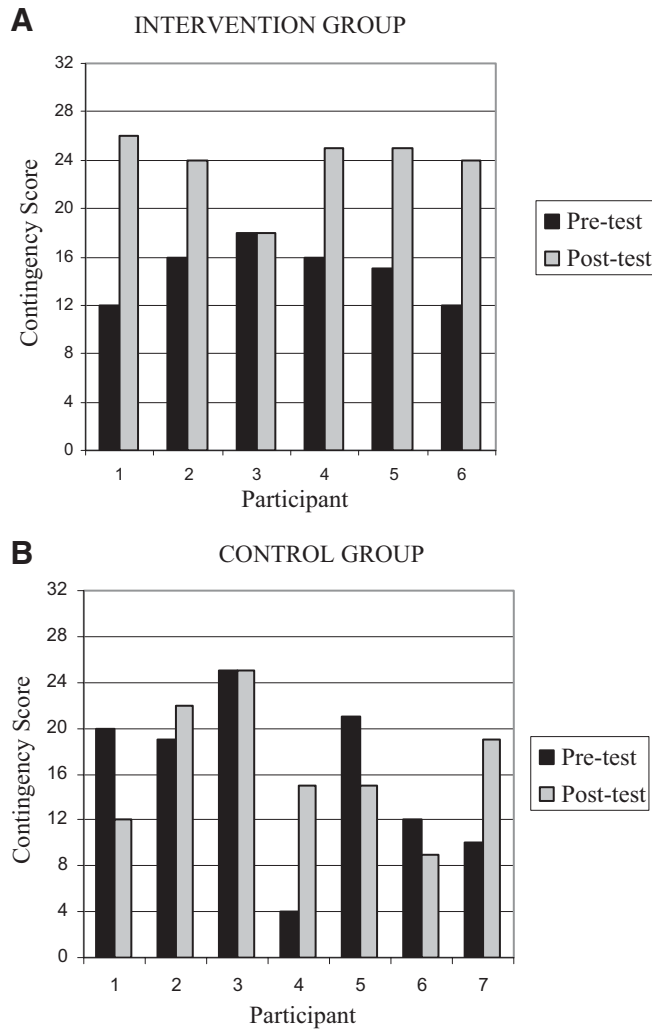


FIGURE 1. Pre-test and post-test contingent responsiveness subscale scores by: (A) Intervention group; (B) Control group.

Postnatal Depression Scale was negatively correlated in the intervention group ($r = -.974$, $p = .001$) alone; and neither the mother's age nor highest grade completed were correlated in either the intervention or control group. Table 3 contains the regression results for confounders and judgments of confounder likelihood, not the results of these correlations. The description of how we assessed for confounders is in the Data Analysis section.

DISCUSSION

Early parent-child interaction is important to an infant's growth and development. The social

conditions and developmental tasks of adolescent motherhood provide challenges for the achievement of positive parent-child interaction, thus placing the infants of adolescent mothers at increased risk for intellectual and social-emotional problems. The purpose of this study was to test the effect of adding an educational component, Keys to Caregiving, to the baseline social support offered in three adolescent community-based support programs. The variation in scores on the pre-test NCATS Contingency Subscale was reduced considerably in the intervention group at post-test while remaining high in the control group. Data analyses revealed that the intervention and control groups of mother-infant dyads became more contingently responsive

Table 3. Testing for Confounding Effects of the Demographic and Base line Measures

Variables	B (sig.)	Change (%)	Confounder
Intervention	7.98 (.04)		
Intervention + age	7.21 (.07)	9.6	Maybe
	-1.77 (.39)		
Intervention + highest grade achieved	6.83 (.09)	-14.4	Yes
	-2.00 (.34)		
Intervention + DLC	8.77 (.03)	9.9	Maybe
	-0.93 (.18)		
Intervention + EPDS	7.68 (.04)	3.8	No
	-0.57 (.13)		

over time. However, contingent responsiveness within mother–infant dyads in the intervention group showed greater enhancement over time than in the control group, with one participant maintaining her score and the remaining five increasing their scores. The control group showed greater variation in their post-test results, as four participants increased their scores, 1 scored the same, and 2 decreased their scores. This suggests that the participants in the intervention group were demonstrating similar patterns of interaction by the end of the intervention, with those initially scoring low catching up to their peers. Unfortunately, the study was underpowered, and conclusions can not be drawn about between-group differences using repeated measures analysis of variance.

There are a number of reasons that both groups became more contingently responsive over time which may have diluted the treatment effect. The normative NCATS data (Sumner & Spietz, 1994) suggests that healthy mothers and infants improve their scores with the age of the infant and as mothers and infants learn about each other. The baseline social support that was provided within the study and the mothers' participation in the social support programming may have also contributed to this effect. Some participants may also have interacted in group support sessions, while they accessed childcare, and during school. Although instructed not to talk about their participation in the study with others in their program, participants in the control group (who were blinded to their allocation and the nature of the intervention) may have observed and taken up some newly learned responsive behaviors demonstrated by a peer in the intervention group. This interaction may have diluted the treatment effect but is consistent in a trial that is examining the effect of an intervention within a community-based context.

Our exploration of potential confounding variables revealed that maternal age, level of education, and Difficult Life Circumstances may influence the impact of the intervention. The small sample size is a limitation. For example, only one participant scored at risk for depression on the Edinburgh Postnatal Depression Scale, therefore any influence of depression on the effectiveness of the intervention is difficult to discern. Difficult life circumstances appear to be a factor in developing contingent responsiveness in both groups and may have influenced the uptake of the intervention for this group of participants. The study requirement that participants be judged by staff at the participating community agency to have backgrounds stable enough for participation may have left out willing participants who may have shown a differential benefit from the intervention because of these circumstances. This gate-keeping may have also been the reason younger adolescents were not successfully recruited to the study.

Another challenge to the administration of the study was the need to hire and train a second interventionist. Despite similarities in their training and standardization of the intervention, there may have been differences in delivering the intervention that influenced the study outcomes. For example, they may have differed in working with adolescent mothers, in the way they presented the material, and in their teaching abilities. Understanding and implementing the research protocols was initially difficult for the second interventionist who failed to obtain and video record a pre-test NCAT for a participant before starting the intervention. This unevenness in interventionist skill can be expected in a community-based environment and therefore is part of a test of effectiveness for this intervention.

The strength of the study is that the direct teaching intervention was delivered within real life community support programs. Challenges in

conducting research in this environment limited the ability to accrue an adequate sample size despite efforts for relationship building and open communication. The findings reveal that the introduction of the Keys to Caregiving Program, delivered by an additional caseworker assigned to the family, may enhance maternal–infant interactions when examined using a within-subjects analysis. Further research with larger numbers is required to establish the effectiveness and generalizability of this direct teaching approach of early parenting. Additionally, teaching interventions may need to be adapted for the unique needs of adolescents with depression and other difficult life circumstances and studies need to be done that target these groups specifically. Finally, a longitudinal approach with follow-up at 6 and 12 months would have enabled us to examine any long-term benefits from the intervention.

REFERENCES

- Barnard, K. (1997). Influencing parent–child interactions for children at risk. In M. Guralnick (Ed.), *The effectiveness of early intervention* (pp. 249–268). Baltimore, MD: Paul Brookes.
- Beck, C.T. (1995). The effects of postpartum depression on maternal–infant interaction: A meta-analysis. *Nursing Research*, 44, 298–304.
- Brown, S.J. (2002). Nursing intervention studies: A descriptive analysis of issues important to clinicians. *Research in Nursing & Health*, 25, 317–327.
- Bunting, L., & McAuley, C. (2004). Research review: Teenage pregnancy and motherhood: The contribution of support. *Child and Family Social Work*, 9, 207–215.
- Carter, S.L., Osofsky, J.D., & Hann, D.M. (1991). Speaking for the baby: A therapeutic intervention with adolescent mothers and their infants. *Infant Mental Health Journal*, 12, 291–301.
- Cox, J.L., Holden, J.M., & Sagovsky, R. (1987). Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. *British Journal of Psychiatry*, 150, 782–786.
- Drummond, J., Letourneau, N., Neufeld, S., Harvey, H., Elliott, M.R., & Reilly, S. (1999). Infant crying and parent–infant interaction: Theory and measurement. *Infant Mental Health*, 20, 452–465.
- Faul, F., & Erdfelder, E. (1992). GPOWER: A priori, post-hoc and compromise power analysis for MS-DOS [computer program]. Bonn, FRG: Bonn University Department of Psychology.
- Furstenberg, F.F., Jr., Brookes-Gunn, J., & Morgan, S.P. (1987). *Adolescent mothers in later life*. New York: Cambridge University Press.
- Guralnick, M.J. (1997). Second-generation research. In M.J. Guralnick (Ed.), *The effectiveness of early intervention* (pp. 3–20). Baltimore, MD: Paul H. Brookes.
- Hayes, C. (1987). *Risking the future: Adolescent sexuality, pregnancy and parenting* (Vol. 1). Washington, DC: National Academy Press.
- Heinicke, C.M., Goorsky, M., Moscov, S., Dudley, K., Gordon, J., Schneider, C, et al. (2000). Relationship-based intervention with at-risk mothers: Factors affecting variations in outcome. *Infant Mental Health Journal*, 21, 133–155.
- Hoffman, S.D., Foster, E.M., & Furstenberg, F.F., Jr. (1993). Reevaluating the costs of teenage childbearing. *Demography*, 30, 1–13.
- Holtz, V.J., McElroy, S.G., & Sanders, S.G. (1997). The costs and consequences of teenage childbearing for mothers. In R.A. Maynard (Ed.), *Kids having kids: The economic costs and social consequences of teen pregnancy* (pp. 55–94). Washington, DC: Urban Institute Press.
- Hunninghake, D., Darby, C., & Probstfield, J. (1987). Recruitment experiences in clinical trials: Literature summary and annotated bibliography. *Controlled Clinical Trials*, 8, 6S–30S.
- Johnson, S., Booth, C.L., & Barnard, K.E. (1989). *Difficult life circumstances: A resource manual for professionals*. Seattle, WA: NCAST Publications.
- Jones, C., Clark, L., Grusec, J., Hart, R., Plickert, G., & Tepperman, L. (2002). *Poverty, social capital, parenting and child outcomes in Canada*. Ottawa, Ontario: Applied Research Branch, Strategic Policy, Human Resources Development Canada (Cat. No: RH63-1/557-01-03E).
- Kaplan, P.S., Bachorowski, J., & Zarlengo-Strouse, P. (1999). Child-directed speech produced by mothers with symptoms of depression fails to promote associative learning in 4-month-old infants. *Child Development*, 70, 560–570.
- Klerman, L.V. (1993). Adolescent pregnancy and parenting: Controversies of the past and lessons for the future. Gallagher Lecture presented at the Annual Meeting of the Society for Adolescent Medicine, Chicago, IL.
- Lamb, J., Puskar, K.R., & Tusaie-Mumford, K. (2001). Adolescent research recruitment issues and strategies: Application in a rural school setting. *Journal of Pediatric Nursing*, 16, 43–52.
- Lesser, J., Koniak-Griffin, D., & Anderson, N.L.R. (1999). Depressed adolescent mothers' perceptions of their own maternal role. *Issues in Mental Health Nursing*, 20, 131–149.
- Letourneau, N. (2001). Improving adolescent parent–infant interactions: A pilot study. *Journal of Pediatric Nursing*, 16, 53–62.
- Letourneau, N., Stewart, M., & Barnfather, A. (2004). Adolescent mothers: Support needs, resources, and support-education interventions. *Journal of Adolescent Health*, 35, 509–525.
- Leventhal, H., Nerenz, D., Leventhal, E., Love, R., & Bendena, L. (1991). The behavioral dynamics of clinical trials. *Preventive Medicine*, 20, 132–146.
- Logson, M., Gagne, P., Hughes, T., Patterson, J., & Rakestraw, V. (2005). Social support during

- adolescent pregnancy: Piecing together a quilt. *JOGNN*, 34(5), 606–614.
- Lonigan, C.J., Elbert, J.C., & Johnson, S.B. (1998). Empirically supported psychosocial interventions for children: An overview. *Journal of Clinical Child Psychology*, 27, 138–145.
- Mahoney, G., Kaiser, A., Girolametto, I., MacDonald, J., Robinson, C., Safford, P, et al. (1999). Parent education in early intervention: A call for a renewed focus. *Topics in Early Childhood Special Education*, 19, 131–140.
- Moore, K., Morrison, D., & Greene, A. (1997). Effects on children born to adolescent mothers. In R. Maynard (Ed.), *Kids having kids: The economic costs and social consequences of teen pregnancy* (pp. 145–180). Washington, DC: Urban Institute Press.
- Nursing Child Assessment Satellite Training. (1990). *Keys to caregiving: Self-instructional video series*. Seattle, WA: NCAST Publications, University of Washington.
- O'Hara, M.W., Neunaber, B.J., & Zekoski, E.M. (1984). Prospective study of postpartum depression: Prevalence, course, and predictive factors. *Journal of Abnormal Psychology*, 93, 158–171.
- Ruchala, P., & James, D. (1997). Social support, knowledge of infant development, and maternal confidence among adolescent and adult mothers. *Journal of Obstetric, Gynecologic, and Neonatal Nursing*, 26, 685–689.
- Ruff, C. (1987). How well do adolescents mother? *Maternal Child Nursing*, 12, 249–253.
- Sadler, L., Swartz, M., Ryan-Krause, P., Seitz, V., Meadows-Oliver, M., Grey, M., et al. (2007). Promising outcomes in teen mothers enrolled in a school-based parent support program and child care centre. *Journal of School Health*, 77(3), 121–130.
- Scholl, T.O., Hediger, M.L., & Belsky, D.H. (1994). Prenatal care and maternal health during adolescent pregnancy: A review and meta-analysis. *Journal of Adolescent Health*, 15, 444–456.
- Shapiro, J., & Mangelsdorf, S. (1994). The determinants of parenting competence in adolescent mothers. *Journal of Youth and Adolescence*, 23, 621–641.
- Stewart, M. (1993). *Integrating social support in nursing*. New York: Sage.
- Sumner, G., & Spietz, A. (1994). *NCAST caregiver-child interaction teaching manual*. Seattle, WA: NCAST Publications, University of Washington, School of Nursing.
- Wasserman, G.A., Brunelli, S.A., & Rauh, V.A. (1990). Social supports and living arrangements of adolescent and adult mothers. *Journal of Adolescent Research*, 5, 54–66.
- Weisz, J.R., Donenberg, G.R., Han, S.S., & Weiss, B. (1995). Bridging the gap between laboratory and clinic in child and adolescent psychotherapy. *Journal of Consulting and Clinical Psychology*, 63, 688–701.
- Wilson, W.J. (1996). *When work disappears: The world of the new urban poor*. New York: Alfred A. Knopf.
- von Windeguth, B., & Urbano, R. (1989). Teenagers and the mothering experience. *Pediatric Nursing*, 15, 517–520.