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Outcomes of a Massage Intervention on Teen Mothers: A Pilot Study

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The difficulties that adolescent mothers encounter as a result of the combined stress of adolescence, parenthood, maintaining peer relationships, and establishing positive relationships with their infants have been identified in the literature, and these characteristics are often associated with poor infant outcomes. This study was designed to examine the effects of an infant massage intervention on adolescent mothers' attitudes and perceptions of their infants. Twenty-five African-American adolescent mothers (mean age 16.13 years), who were enrolled in a parent training program for high school students in a southern state, participated in the project. The mothers were assigned randomly to an intervention (9) or control group (16). After a brief training session, participants in the intervention group practiced massage with their infants for approximately 2 months. Data analysis was based on the 15 participants who completed both baseline and 2-month follow-up measures (8 in the control group and 7 in the intervention group). This study found some support for teaching infant massage to adolescent mothers as a way of enhancing maternal-infant physical contact and lowering depression, as well as positively influencing mothers' perceptions of infant temperament. Results indicate that infant massage training may lead to improvements beyond those achieved with a typical parent education curriculum and shows potential as a low-cost supplement to current teen mother education in high schools.

After a steady decline in teen births from 1991 to 2005, data from the Centers for Disease Control and Prevention (CDC) indicate that the number of teen births increased again in 2006. Birth rates for U.S. teen mothers (15 to 19 years of age) rose 3% in 2006 (Hamilton, Martin, & Ventura, 2007). This is particularly concerning because research findings indicate teen mothers are less knowledgeable about normal child development, display fewer and poorer quality reciprocal vocalizations with their infants, and are less aware of and responsive to their child's needs. Teen mothers are also less likely to spend time looking at their babies, are more ambivalent about being a mother, and are at increased risk for depression (Dukewich, Borkowski, & Whitman, 1999). For adolescent mothers, high parental stress was associated with increased maternal focus on more negative aspects of infant behavior, such as crying and fussiness. Researchers suggest that infants of teen mothers are at high risk for less positive mother-infant interaction and cognitive stimulation that might result in cognitive, language, or social difficulties (Secco & Moffatt, 2003). Consequently, there appears to be a need for an intervention that will enhance the parent-child relationship and maternal confidence within this population.

A great deal of information related to the benefits of infant massage for premature infants is available in the literature (Field, 1998). These findings suggest that the massage may help enhance the development of sleep/wake patterns in pre-term infants (Dieter, Field, Hernandez-Reif, Emory, & Redzepi, 2003). Pre-term infants also gained more weight, scored higher on the Brazelton scale (a measure of babies' strengths, adaptive responses, and possible vulnerabilities), and had shorter hospital stays than control infants (Field et al., 1986). However, only a few studies have focused on infants of teen mothers. Although research on the benefits of touch interventions on parents has not been the primary focus of most infant massage studies, benefits have been found in the areas of parental depression, as well as more appropriate care-giving behavior (Onozawa, Glover, Adams, Modi, & Kumar, 2001; Weiss, Wilson, Hertenstein, & Campos, 2000). Additionally, the positive behavioral outcomes elicited by parental touch are associated with

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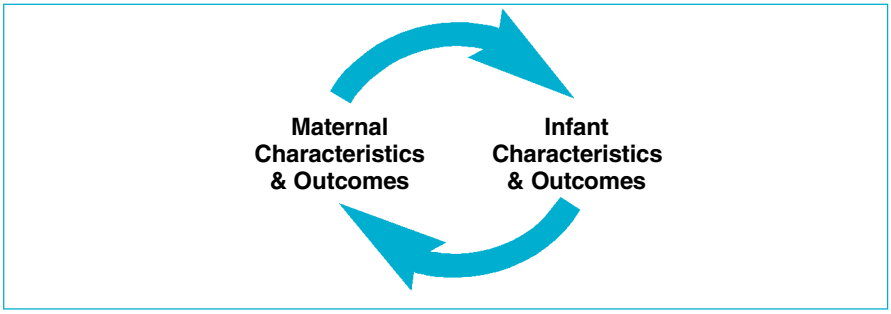
Objectives and the CNE posttest can be found on pages 296-297.

Table 1.
ANOVA Comparing the Groups on Demographic Variables

	Massage Intervention vs. Control			Means (Standard Deviation)	
Variable	*df*	*f*	*p*	Control (*n* = 8)	Massage (*n* = 7)
Mother's age (years)	1,13	3.13	0.10	16.25 (0.89)	17.14 (1.07)
Infant's birth weight (pounds)	1,13	0.55	0.47	6.28 (1.51)	6.75 (1.10)
Infant's age (days)	1,12	1.44	0.25	52.71 (24.18)	84.00 (64.67)
Mother's current grade	1,10	2.48	0.15	10.50 (1.11)	11.00 (1.41)

Figure 1.
Infant Massage as Described by Sameroff's Transactional Model



Note: Maternal characteristics and outcomes that may be influenced by infant massage training include increased knowledge about infant cues, enhanced recognition of and more important reaction to infants' needs, perceptions of more satisfied and content infants, increased maternal confidence, decreased parental stress, and maternal depression. Infant characteristics and outcomes that may be influenced by infant massage training include more content infants, and positive infant responses and outcomes.

more positive mother-infant interactions (Weiss et al., 2000). Teaching parents about their infants' development and behavioral cues may help these parents provide a more nurturing and developmentally appropriate environment for their infants. This in turn may help increase maternal confidence and ensure that these infants will have good developmental outcomes. However, research is required to support these hypotheses.

Sameroff's transactional model (Sameroff & Chandler, 1975) has been used to explain the role that maternal characteristics play in shaping infant responses and vice versa (Goodman, Hans, & Bernstein, 2005; Van Doesum, Hosman, & Riksen-Walraven, 2005). The current study utilized the transactional model as the theoretical basis for predicting maternal benefits in relation to infant massage training for teen mothers. The model suggests that infant massage provides mothers with knowledge about infant cues. This knowledge may help mothers recognize and react more appropriately to their infants' needs, which in turn may result in maternal perceptions of more satisfied and content infants. Additionally, more content infants may result in increased maternal confidence, as well as decreased parenting stress and maternal depression because mothers perceive their actions and behaviors as resulting in positive infant responses and outcomes. Positive infant responses may then serve as reinforcers for mothers to use the knowledge that they gained through infant massage training (see Figure 1).

The overall purpose of the current study was to expand the research in infant massage therapy to the teen mother population and use theory to develop, implement, and evaluate a massage intervention that would have direct and indirect benefits for the mother. Based on existing literature, researchers hypothesized that the massage intervention participants would have higher maternal confidence, greater reduction in maternal depression, lower parenting stress, and more positive feelings about physical contact after 2 months than teen mothers who did not massage their infants. It was further hypothesized that infants who received infant massage from their mothers would be perceived by their mothers as having more adaptive temperaments at 2 months after the massage training than infants who did not receive infant massage from their mothers.

Methodology

Sample

The current study involved a 2 (group – control and massage intervention) x 2 (time – baseline and post-intervention) mixed factorial design. Twenty-five African-American teen mothers aged 14 to 18 years (M = 16.13, SD = 1.15) and attending classes (grades 9 through 12) through a Young Mothers' Program in two urban high schools in the southeast United States participated in the project. The mothers were assigned randomly to a control (n = 16) or intervention (n = 9) group using a random number table. This Young Mothers' Program serves as a parent training program for high school students, and focuses on educational and vocational concerns for the mother. It also attempts to increase knowledge of child development and improve attitudes and perceptions about parenting. Table 1 includes information about the demographic characteristics of the sample.

Due to difficulty in tracking participants who transferred schools or were unable to be contacted via the phone or in person, follow-up data were obtained for only 15 of the 25 participants. Data analysis is thus based on the 15 participants who completed both baseline and follow-up measures.

Measurement

Demographic information for both groups was obtained using a self-report questionnaire that included age, race, education, and number of children. The Parenting Stress Index

(PSI) (Abidin, 1995) was completed to identify stress in parent-child dyads, which may put them at risk for future dysfunctional parenting behaviors or childhood emotional or behavior problems. It consists of 120 statements about parents' perceptions of child behavior and attitudes about parenting. Questions are rated on a 5-point Likert scale, ranging from *strongly agree* to *strongly disagree*. Responses are combined to form 6 subscales in the child domain (distractibility/hyperactivity, adaptability, reinforces parents, demandingness, mood, acceptability), which measure temperament, and 7 subscales in the parent domain (competence, isolation, attachment, health, role restriction, depression, spouse support), which measure parental stress. Total scores on the child domain and parent domain were used in data analysis to examine mothers' perceptions of infant temperament and parenting stress, respectively. Higher scores indicate less adaptive infant temperament and higher parenting stress. Factor analysis was used to examine this measure for content and construct validity. Test-retest reliability for the PSI has been shown to have a high correlation coefficient of 0.96. Internal consistency of the PSI is also high, with an alpha coefficient of 0.95 for the total scale, 0.90 for the child domain, and 0.93 for the parent domain (Abidin, 1995). For the current study, internal consistency of the PSI was high, with an alpha coefficient of 0.84 for the child domain and 0.88 for the parent domain.

The Maternal Confidence Questionnaire (MCQ) (Parker & Zahr, 1985) measures the degree of confidence in a parenting role. It is composed of 14 statements rated on a 5-point Likert scale, ranging from *never* to *always*. Total scores range from 14 to 70. The MCQ is unidimensional, with a higher score indicating a higher perceived competence. A review of 20 studies that used the MCQ suggests that this measure is flexible, reliable, and valid for a variety of populations, such as mothers of preterm infants and infants with birth defects from numerous cultures (Badr, 2005). However, specific studies using the MCQ with teen mothers could not be identified. Evidence of face and content validity for the MCQ has been established (Zahr, 1991, 1993). Alpha coefficients for the total items ranged between 0.86 to 0.93. The internal-consistency reliability has been found to be 0.89. A positive correlation between the MCQ scores and the Parenting Sense of Competence Scale, where $r = 0.53$, $p < 0.05$, was used to establish concurrent validity (Gibaud-Wallston & Wandersman, 1977). For the current study, the internal-consistency reliability was 0.79.

The Beck Depression Inventory II (BDI-II) (Beck, Steer, & Brown 1996) was used to assess maternal depression. The BDI-II is a questionnaire consisting of 21 groups of statements, with each item scored on a 4-point scale indicating the presence and severity of depressed feelings/behaviors/symptoms. Possible scores range from 0 to 63, with higher scores indicating greater levels of depression. The internal-consistency reliability has been found to be 0.92 (Beck at al., 1996). Evidence for convergent and discriminant validity has also been reported in the BDI-II manual (Beck et al., 1996). The internal-consistency reliability for this study has been found to be 0.94. Steer and Beck (1988) suggest after reviewing numerous studies' use of the BDI with adolescents that the BDI is adequate for individuals 13 years of age and older. For this study, scores were analyzed as a categorical variable, with scores greater than or equal to 12 indicating depression (Lasa, Ayuso-Mateos, Vázquez-Barquero, Diez-Manrique, & Dowrick, 2000).

The Questionnaire about Physical Contact created by Sandra Weiss (personal communication, S. Weiss), November 2005) consists of 3 sections with a total of 24 questions that address an individual's thoughts and feelings about physical contact with others during three different time periods: one's ongoing life, childhood, and current relationships with family and friends. Each item is scored on a 4-point Likert scale. Responses from the ongoing life and current relationships sections were used to determine the effects of the infant massage intervention on feelings about physical contact. For both sections, higher scores indicate positive experiences and higher comfort with physical contact. Internal reliability for this measure has been found to be 0.83 (Weiss et al., 2000).

Data Collection

A convenience sample of participants was recruited for three semesters from the Young Mothers' Program located at two urban high schools. After approval of the study by the Institutional Review Board and with permission of the superintendent and both high school principals, the principal investigator attended Young Mothers' Program classes, explaining the study requirements and procedures. Before beginning the project, the informed consent form for the project was explained; students completed the form and were then given a copy.

Baseline assessments were gathered approximately 4 weeks after delivery and included a demographic questionnaire, the BDI-II, the MCQ, the PSI, and the Questionnaire about Physical Contact. The participants were randomly assigned to the control or intervention group, with 16 participants in the intervention and 9 in the contrd group. A time for infant massage training was scheduled for those students in the intervention group. Infant massage training using the Baby's First Massage curriculum created by Teresa Ramsey (www.babysfirstmassage.com) was completed one-on-one at the participant's school immediately after the baseline measures were collected. Each training session lasted approximately 30 minutes. Infants included in the data analysis ranged from 1 to 3 months of age, with a majority infants falling between 1½ months to 2½ months of age. Massage training began with a description and explanation of both welcoming and time-out infant behavioral cues. Other information includes interpretation of infant cries and the benefits of massage for both parent and infant. Although many strokes for various parts of the body are taught, a major emphasis of this curriculum is sensitivity to infant cues and responses. Participants learned the massage strokes on their own infants, if possible. If the infant was not available, massage strokes were demonstrated on a doll. Parents also received a booklet with all the information discussed, as well as diagrams of the massage strokes.

Students in the intervention group were provided with this instruction booklet and 3-ounce bottle of massage oil and asked to massage their infants daily for 2 months. Students in the control group were offered massage training after completion of the follow-up measures.

Follow-up assessments were completed at the Young Mothers' Program high school and consisted of all measures except the demographic questionnaire and were completed approximately 2 to 2½ months after baseline measures were collected.

Data Analysis

Statistical analysis of data consist-

Table 2.
Means (standard deviations) of Pre-Intervention Measures by Group

Measure	Control		Massage Intervention	
	Included (n = 8)	Total (n = 16)	Included (n = 7)	Total (n = 9)
BDI-II	9.88 (5.22)	12.47 (10.64)	8.17 (8.18)	11.88 (14.08)
MCQ	58.75 (9.02)	60.50 (6.89)	64.20 (5.45)	64.00 (4.47)
PSI child domain (%)	58.13 (33.69)	59.69 (27.84)	38.57 (34.12)	35.00 (30.62)
PSI parent domain (%)	55.50 (35.42)	59.31 (34.12)	38.57 (31.32)	45.44 (33.75)
Physical contact (ongoing)	29.13 (4.36)	28.19 (3.64)	28.43 (3.99)	29.11 (3.79)
Physical contact (current)	18.00 (3.07)	18.63 (3.36)	17.29 (5.06)	17.67 (4.56)

ed of descriptive statistics, bivariate correlations, an analysis of covariance (ANCOVA) for each continuous measure, and Chi-square tests for categorical measures. The Statistical Package for Social Science (version 14.0: Chicago) was used to calculate the statistics. ANCOVA (Maxwell & Delaney, 1990; Rogosa & Willett, 1983) was used to study the effects of the intervention on the post-test measures. Descriptive statistics were first generated to examine the distribution of scores, and were examined for kurtosis and skewness. In addition, Levine's method was used to test the homogeneity of variances. No significant differences in the variance were found between groups. These analyses indicated the assumptions of ANCOVA were met and results are consequently valid. Pre-test scores for each outcome variable were included as a covariate to reduce error variance and adjust for any difference between the groups prior to intervention. Correlations between pre- and post-test scores, ranging from 0.50 to 0.87, provided support for this use of pre-test scores as covariates.

Results

Demographics

Results of analysis of variance (ANOVA) analyses comparing the intervention and control groups are included in Table 1 and indicate there were no differences in the two groups on maternal or infant age, or on infant birth weight and mother's grade in school. All pre-intervention means are listed in Table 2. All continuous demographic variables were analyzed using ANOVA.

Maternal Well-Being

The researchers hypothesized that teen mothers who learn to massage their infants would have lower depression, higher maternal confidence, lower parenting stress, and more positive feelings about physical contact after 2 months of massage intervention than teen mothers who do not massage their infants. The Chi square test was used to assess group differences on depression scores. ANCOVAs were used to compare the change in maternal confidence, parental stress in the parent domain, and feelings about physical contact (ongoing and current) for teen mothers who received infant massage training with that of the teen mothers who did not receive the training (see Table 3).

Table 3.
Analysis of Covariance for Massage Intervention vs. Control

Measure	Adjusted Post-Test Means		*df*	F	*p*
	Control	Intervention			
MCQ	60.63 (7.05)	67.00 (2.35)	1,10	2.39	0.15
PSI child domain (%)	63.00 (30.06)	28.57 (19.52)	1,12	5.52	0.02*
PSI parent domain (%)	69.38 (29.57)	44.29 (24.05)	1,12	2.19	0.17
Physical contact (ongoing)	29.38 (5.07)	32.14 (3.53)	1,12	2.57	0.14
Physical contact (current)	17.25 (3.06)	19.57 (4.72)	1,12	7.50	0.02*

* $p < 0.05$

There was a significant difference in feelings about physical contact within current relationships with friends, family, and significant others (F [1, 12] = 7.50, $p < 0.05$). Teen mothers in the intervention group indicated more positive and comfortable feelings about physical contact with their current relationships than those in the control group (adjusted *Ms* 19.57 and 17.25, respectively). However, there was no significant difference between control and massage intervention groups in maternal confidence, parental stress in the parent domain, or ongoing feelings about physical contact with people. The Chi square test revealed that teen mothers who were trained in infant massage had significantly lower depression scores than teen mothers without massage training (χ^2 [1, 10] = 4.57, $p < 0.05$).

Mothers' Perceptions of Infant Temperament

The researchers further hypothesized that infants who receive infant massage from their mothers would be perceived by their mothers as having more adaptive temperaments at 2 months after massage training than infants who do not receive infant massage from their mothers. Although infant development outcomes were not directly assessed, mothers' perceptions of child temperament were measured by the PSI child domain subsection. To analyze the impact that infant massage had on infant behavior, an ANCOVA was performed for PSI child domain scores by group (control and massage intervention). ANCOVA results showed that there was a significant difference in perceived child temperament (F [1, 12] = 6.52, $p < 0.05$). Teen mothers in the intervention group reported significantly more adaptive temperament than teen mothers in the control group (adjusted *Ms* 28.57 and 63.00, respectively).

The results of these two sets of analyses suggest that the massage intervention had a positive impact on mothers' current level of comfort with physical contact, maternal depression, and maternal perceptions of more adaptive child temperaments. However, significant group differences were not found in other measures. Although these analyses failed to show significant group differences on a number of measures, these findings may not be truly indicative of the effects of an infant massage intervention on teen mothers and their infants because of small sample size, and consequently, low statistical power.

Effect Sizes

Effect sizes for each measure were calculated to determine the degree of impact the massage intervention had on each variable compared to controls. Cohen's *d* was calculated by subtracting the corrected intervention post-test mean from the corrected contrd post-test mean for each measure and dividing this difference by the pooled standard deviation for each measure ($d = [M_1\text{-}M_2]/SD_{pooled}$). According to Cohen (1988), effect sizes can be interpreted as small ($d = 0.2$), medium ($d = 0.5$), or large ($d = 0.8$). Using these guidelines, the massage intervention exhibited a medium effect size on feelings of physical contact with current relationships ($d = 0.59$). A large effect size of massage intervention was found for parental stress, maternal perception of infant temperament, and positive feelings related to physical contact ($d = 0.92$, 1.34, and 0.62, respectfully). Furthermore, a large effect size of massage intervention was found for both depression and maternal confidence ($d = 0.91$ and 1.10, respectively).

Discussion

Previous massage studies have identified positive effects on infant development, mother's psychological well-being, and mother-infant interactions in relation to infant massage (Field et al., 1986; Onozawa et al, 2001). However, the primary focus of infant massage research has been in the pre-terminfant population and on benefits related to the physical aspects of massage. The purpose of this study was to examine the effects of an infant massage intervention for teenage mothers. The results of this study provide some support for the usefulness of teaching infant massage to teen mothers as a way of enhancing maternal-infant physical contact and lowering maternal depression. This study also supports the use of teaching infant massage as a way of increasing maternal awareness of infant states by providing teen mothers with the skills to assess infant behavior. In addition, infant massage provides an opportunity for teen mothers to interact with their infant based on sensitivity to the baby's readiness for stimulation. This is likely to result in better infant responses and can therefore influence the mother's perception of infant temperament.

Maternal confidence in the intervention group increased, although this change did not prove to be significant. However, the large effect sizes found in this study were suggestive of important effects requiring further investigation with larger samples. When mothers are knowledgeable and confident in their parenting abilities, infants' needs are quickly and appropriately met. Consequently, a trusting relationship between mother and infant is formed, and the infant has a healthy platform to begin his or her development. A number of items on the measure of maternal confidence were directly related to recognizing infant cues. This lends support to the interpretation of the importance of infant behavioral cue knowledge in the establishment of maternal confidence.

In addition, significant differences between the control and intervention groups in the area of depression, along with the large effect size associated with post-intervention depression scores, indicate that the massage intervention may help lower depression in teen mothers. Although both groups showed improvement in depression scores from baseline, teen mothers in the massage intervention group had much larger improvements in depression scores than their controls, which replicate the findings of Onozawa and colleagues (2001) in an adult depressed population. It is possible that increased knowledge of infant cues may facilitate positive mother-infant interaction, which in turn may benefit the mother's depression. The mediating mechanisms should be explored in depth in future studies.

Teen mothers were significantly more comfortable with physical contact among family and friends after the massage intervention. This seems to indicate a change in attitude toward the importance of physical contact within close relationships. These results may have effects on mother-infant interactions because of the benefits of physical touch on attachment. In addition, enhanced comfort with physical contact from family and friends may serve as a protective factor against depression. However, significant differences between groups in individual attitudes toward on-going physical touch with others were not found. This suggests that infant massage training may influence an individual's assessment of the importance and benefits of physical contact with close friends and family members, but may not have a significant impact on an individual's general attitude about physical contact.

Finally, maternal perception of infant temperament was significantly influenced by massage training. Teen mothers trained in infant massage rated their infants more positively in terms of temperament, supporting the idea that the mother-infant relationship is transactional. In other words, because mothers are better equipped to recognize and understand infant behavior, they may respond more appropriately to these behaviors. This appropriate response by the mother reinforces the infant's behavior because the infant's needs are met, resulting in a satisfied and presumably content infant. Finally, this display of contentment and happiness by the infant serves to verify the mother's confidence in parenting. So, this finding suggests that teen mothers trained in infant massage may be better prepared to interpret infant behavior and respond appropriately, which leads to positive assessment of infant behavior.

This study serves the purpose of integrating a number of separate areas of research. Previous research has emphasized the benefits of providing information about infants to their mothers (Bialoskurski, Cox, & Wiggins, 2002; Mazurek-Melnyk, Fischbeck-Feinstein, & Fairbanks, 2002; Pridham, Limbo, Schroeder, Thoyre, & Van Riper, 1998) and interventions that facilitate nurturing touch (Field, Scafidi, & Schanberg, 1987). Because infant massage combines both variables, it is possible that both information sharing and physical touch are responsible for the benefits associated with infant massage. The population in this study was particularly appropriate for training in both areas. These teen mothers indicated low levels of comfort and experience with physical contact at baseline. Teen mothers have also been shown to be less knowledgeable about child development (Mann, Pearl, & Behle, 2004). Therefore, the massage training intervention served the purpose of providing teen mothers with the knowledge

they lacked about both normal infant behavior and the benefits of physical contact.

Limitations

Despite some significant findings of this study, answers to a number of questions remain unclear. The population used for this study was a group of urban, African-American students whose families tend to be quite mobile. This made follow-up data collection difficult. A poor retention rate made it difficult to generalize these results and contributed significantly to the small sample size.

The inability to monitor compliance with the massage intervention was another limitation of this study. Although mothers were asked to complete a worksheet that would document each massage session, no worksheets were completed and returned. Therefore, it is unclear whether the findings are related to actually massaging their infants or simply being provided with the knowledge about infant behavior. Future studies should ask participants about massage frequency at follow up to assess compliance with the massage intervention.

A few limitations in study design are also important to highlight. All measures were self-report, and therefore, subject to potential response bias. Additionally, a literature review failed to find previous use of some measures (the Maternal Confidence Questionnaire and the Questionnaire about Physical Contact) with a teen population. Another measurement issue was the large variability found within the depression scores. This indicates a need for consideration of other measures for depression assessment in the future. Shorter and more postpartum-specific depression measures, such as the Edinburgh Postnatal Depression Scale, may be more appropriate for studies of new mothers. Additionally, infant development outcomes were not directly assessed with an objective measure. The results of the current study gave some support for the notion that infant development is influenced by the mother. Due to the short interval between baseline and follow-up data collection, this relationship is still unclear. Future studies should use a longitudinal design with multiple data collection points to determine the persistence of group differences over time. Finally, to determine the separate roles that different components of infant massage play in both parent and infant outcomes, knowledge about infant behavior and physical stimulation through massage need to be compared as separate and distinct interventions.

Implications

Although further investigations are necessary, the current study provides insights into the feasibility and effectiveness of teaching infant massage as a component of schools' teen parenting education curriculum. This study did not assess the effectiveness of current methods employed with the teen mothers in this particular parent education program; however, results indicate that infant massage training may lead to improvements beyond those achieved with a typical parent education curriculum. The desire for all control participants to be trained in infant massage after completion of the study suggests that this form of intervention may be accepted and perhaps even enjoyed by teen parents in parenting education classes. Infant massage training shows potential as a supplement to current teen mother education in high schools. Infant massage is a well-researched, simple, inexpensive, and innovative technique that provides both hands-on experience and intellectual enhancement. This study indicates the potential benefits of a massage intervention to teenage mothers as a supplement to the traditional parent education curriculum taught in high schools today.

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