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# Touch Research Institute



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Extraits d'études sur le massage et les enfants.

## Massage Therapy Research Abstracts

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### Aggression

Diego, M.A., Field, T., Hernandez-Reif, M., Shaw, J.A., Rothe, E.M., Castellanos, D. & Mesner, L. (2002). Aggressive adolescents benefit from massage therapy. *Adolescence*, 37, 597-607.

**METHOD:** Seventeen aggressive adolescents were randomly assigned to a massage therapy group or a relaxation therapy group to receive 20-minute therapy sessions, twice a week for five weeks. **RESULTS:** The massaged adolescents had lower anxiety after the first and last sessions. By the end of the study, they also reported feeling less hostile and they were perceived by their parents as being less aggressive. Significant differences were not found for the adolescents who were assigned to the relaxation group.

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## Anorexia

Hart, S., Field, T. & Hernandez-Reif, M., Nearing, G., Shaw, S., Schanberg, S., & Kuhn, C. (2001). Anorexia nervosa symptoms are reduced by massage therapy. *Eating Disorders*, 9, 289-299.

**METHOD:** Women diagnosed with anorexia nervosa were given a massage twice per week for five weeks or standard treatment. **RESULTS:** The massaged women reported lower stress and anxiety levels and showed lower cortisol levels immediately following the massage. Over the five-week treatment period, they also reported decreased body dissatisfaction on the Eating Disorder Inventory and showed increased dopamine and norepinephrine levels.

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## Anxiety

Field, T., Morrow, C., Valdeon, C., Larson, S., Kuhn, C. & Schanberg, S. (1992). Massage reduces anxiety in child and adolescent psychiatric patients. *Journal of the American Academy of Child and Adolescent Psychiatry*, 31, 125-131.

**METHOD:** A 30-minute back massage was given daily for a 5-day period to 52 hospitalized depressed and adjustment disorder children and adolescents. **RESULTS:** Compared with a control group who viewed relaxing videotapes, the massage subjects were less depressed and anxious and had lower saliva cortisol levels after the massage. In addition, nurses rated the subjects as being less anxious and more cooperative on the last day of the study, and nighttime sleep increased over this period. Finally, urinary cortisol and norepinephrine levels decreased, but only for the depressed subjects.

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Shulman, K.R. & Jones, G.E. (1996). The effectiveness of massage therapy intervention on reducing anxiety in the work place. *Journal of Applied Behavioral Science*, 32, 160-173.

**METHOD:** An on-site chair massage therapy program was provided to reduce anxiety levels of 18 employees in a downsizing organization. 15 control group Ss participated in break therapy. Subjects' stress levels were measured with the State-Trait Anxiety Inventory, which was administered twice during pretest, post test, and delayed post test to achieve stable measures. **RESULTS:** Significant reductions in anxiety levels were found for the massage group.

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## Arthritis

Field, T., Hernandez-Reif, M., Seligman, S., Krasnegor, J. & Sunshine, W. (1997). Juvenile rheumatoid arthritis: Benefits from massage therapy. *Journal of Pediatric Psychology*, 22, 607-617.

**METHOD:** Children with mild to moderate juvenile rheumatoid arthritis were massaged by their parents 15 minutes a day for 30 days (and a control group engaged in relaxation therapy). **RESULTS:** The children's anxiety and stress hormone (cortisol) levels were immediately decreased by the massage, and over the 30-day period their pain decreased on self-reports, parent reports, and their physician's assessment of pain (both the incidence and severity) and pain-limiting activities.

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## Asthma

Field, T., Henteleff, T., Hernandez-Reif, M., Martinez, E., Mavunda, K., Kuhn, C. & Schanberg, S. (1998). Children with asthma have improved pulmonary functions after massage therapy. *Journal of Pediatrics*, 132, 854-858.

**METHOD:** Thirty-two children with asthma (16 4- to 8-year-olds and 16 9- to 14-year-olds) were randomly assigned to receive either massage therapy or relaxation therapy. The children's parents were taught to provide one therapy or the other for 20 minutes before bedtime each night for 30 days. **RESULTS:** The younger children who received massage therapy showed an immediate decrease in behavioral anxiety and cortisol levels after massage. Also, their attitude toward asthma and their peak air flow and other pulmonary functions improved over the course of the study. The older children who received massage therapy reported lower anxiety after the massage. Their attitude toward asthma also improved over the study, but only one measure of pulmonary function (forced expiratory flow 25% to 75%) improved. The reason for the smaller therapeutic benefit in the older children is unknown; however, it appears that daily massage improves airway caliber and control of asthma.

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## Attention Deficit Hyperactivity Disorder

Field, T., Quintino, O., Hernandez-Reif, M. & Koslovsky, G. (1998). Adolescents with attention deficit hyperactivity disorder benefit from massage therapy. *Adolescence*, 33, 103-108.

**METHOD:** Twenty-eight adolescents with attention deficit hyperactivity disorder were provided either massage therapy or relaxation therapy for 10 consecutive school days.

**RESULTS:** The massage therapy group, but not the relaxation therapy group, rated themselves as happier and observers rated them as fidgeting less following the sessions. After the 2-week period, their teachers reported more time on task and assigned them lower hyperactivity scores based on classroom behavior.

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Khilnani, S., Field, T., Hernandez-Reif, M., & Schanberg, S. (2003). Massage therapy improves mood and behavior of students with attention-deficit/hyperactivity disorder. *Adolescence*, 38, 623-38.

**METHOD:** The present study involved 30 children and adolescents between the ages of 7 and 18 ( $M = 13$ ) diagnosed with attention-deficit/hyperactivity disorder (ADHD). The children were randomly assigned to a wait-list control and a massage group. The latter group received massage therapy for 20 minutes twice per week over the course of one month. **RESULTS:** Mood state improved for the massage but not the control group based on smiley face and thermometer scales. The massage group also improved in classroom behavior in the areas of the Conners Teacher Rating Scales on anxiety, daydreaming and hyperactivity. The wait-list control group did not show these gains. In sum, the results revealed that massage therapy benefited children and adolescents with ADHD by improving short-term mood state and longer-term classroom behavior.

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## Autism

Escalona, A., Field, T., Singer-Strunk, R., Cullen, C., & Hartshorn, K. (2001). Improvements in the behavior of children with autism. *Journal of Autism and Developmental Disorders*, 31, 513-516.

**METHOD:** Twenty children with autism ranging in age from 3 to 6 years were randomly assigned to massage therapy and reading attention control groups. Parents in the massage therapy group were trained by a massage therapist to massage their children for 15 minutes prior to bedtime every night for one month while the parents of the attention control group read Dr. Seuss stories to their children on the same time schedule. Conners Teacher and Parent scales, classroom and playground observations and sleep diaries were used to assess the effects of therapy on various behaviors including hyperactivity, stereotypical and off-task behavior, as well as sleep problems. **RESULTS:** Results suggested that the children in the massage group exhibited less stereotypic behavior and

showed more on-task and social relatedness behavior during play observations at school, and they experienced fewer sleep problems at home.

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Field, T., Lasko, D., Mundy, P., Henteleff, T., Talpins, S., & Dowling, M. (1986). Autistic children's attentiveness and responsivity improved after touch therapy. *Journal of Autism and Developmental Disorders*, 27, 329-334.

**METHOD:** This study investigated the effects of touch therapy on three problems commonly associated with autism including inattentiveness (off-task behavior), touch aversion, and withdrawal. **RESULTS:** Results showed that touch aversion decreased in both the touch therapy and the touch control group, off task behavior decreased in both groups, orienting to irrelevant sounds decreased in both groups, but significantly more in the touch therapy group, and stereotypic behaviors decreased in both groups but significantly more in the touch therapy group.

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### **Behavior Problems**

Escalona, A., Field, T., Cullen, C., Hartshorn, K., & Cruz, C. (2001). Behavior problem preschool children benefit from massage therapy. *Early Child Development and Care* 161, 1-5.

**METHOD:** Twenty preschool children with behavior problems were randomly assigned to a massage group or a story reading attention control group. The sessions occurred for 15-minutes twice a week for a month. Pre and post session ratings were made on the first and last days of the study by teachers who were blind to the child's group assignment. **RESULTS:** These revealed that the children in the massage therapy group: 1) were more drowsy, less active, less talkative and had lower anxiety levels after the sessions; and 2) were less anxious and more cooperative by the end of the study.

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### **Bulimia**

Field, T., Schanberg, S., Kuhn, C., Field, T., Fierro, K., Henteleff, T., Mueller, C., Yando, R., Shaw, S. & Burman, I. (1998). Bulimic adolescents benefit from massage therapy. *Adolescence*, 33, 555-563.

**METHOD:** Twenty-four female adolescent bulimic inpatients were randomly assigned to a massage therapy or a standard treatment (control) group. **RESULTS:** The massaged patients showed immediate reductions in anxiety and depression (both self-report and behavior observation). In addition, by the last day of the therapy, they had lower depression scores, lower cortisol (stress) levels, higher dopamine levels, and they showed improvement on several other psychological and behavioral measures.

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### Cognition (Learning)

Cigales, M., Field, T., Lundy, B., Cuadra, A., Hart, S. (1997). Massage enhances recovery from habituation in normal infants. *Infant Behavior and Development*, 20, 29-34.

**METHOD:** Four-month-old infants were given either 8 minutes of massage, play, or no stimulation prior to an audiovisual habituation task. **RESULTS:** Infants who received massage showed response recovery from habituation during test trials, whereas those in the other two conditions did not.

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Hart, S., Field, T., Hernandez-Reif, M., & Lundy, B. (1998). Preschoolers' cognitive performance improves following massage. *Early Child Development & Care*, 143, 59-64.

**METHOD:** Preschoolers (M age = 4 years, 4 months) were given WPPSI subtests, including Block Design, Animal Pegs and Mazes, before and after receiving a 15-minute massage or spending 15-minutes reading stories with an experimenter. **RESULTS:** Performance on the Block Design improved following massage and accuracy was greater on the Animal Pegs in the massage group.

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### Constipation

Bishop, E., McKinnon, E., Weir, E., & Brown, D.W. (2003). Reflexology in the management of encopresis and chronic constipation. *Paediatr Nrs.*, 15, 20-1.

**METHOD:** This study investigated the efficacy of treating patients with encopresis and chronic constipation with reflexology. An observational study was carried out of 50 children between three and 14 years of age who had a diagnosis of encopresis/chronic constipation. The children received six sessions of 30-minutes of reflexology to their feet.

With the help of their parents they completed questionnaires on bowel movements and soiling patterns before, during and after the treatment. A further questionnaire was completed by parents pre and post treatment on their attitude towards reflexology. Forty-eight of the children completed the sessions. **RESULTS:** The number of bowel movements increased and the incidence of soiling decreased.

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### **Cystic Fibrosis**

Hernandez-Reif, M., Field, T., Krasnegor, J., Martinez, E., Schwartzman, M. & Mavunda, K. (1999). Children with cystic fibrosis benefit from massage therapy. *Journal of Pediatric Psychology, 24*, 175-181.

**METHOD:** Parents massaged their children with cystic fibrosis to reduce anxiety and their children's anxiety and to improve the children's mood and peak air flow readings. Twenty children (5-12 years old) with cystic fibrosis and their parents were randomly assigned to a massage therapy or a reading control group. Parents in the treatment group were instructed and asked to conduct a 20-minute child massage every night at bedtime for one month. Parents in the reading control group were instructed to read for 20 minutes a night with their child for one month. On days 1 and 30, the parents and children answered questions relating to present anxiety levels and the children answered questions relating to mood, and their peak air flow was measured. **RESULTS:** Following the first and last massage session, the children and parents reported reduced anxiety. Mood and peak air flow readings also improved for the children in the massage therapy group.

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### **Depression**

Field, T., Morrow, C., Valdeon, C., Larson, S., Kuhn, C., & Schanberg, S.(1992). Massage reduces depression and anxiety in child and adolescent psychiatric patients. *Journal of the American Academy of Child & Adolescent Psychiatry, 31*, 125-131.

**METHOD:** A 30-minute back massage was given daily for a 5-day period to 52 hospitalized depressed and adjustment disorder children and adolescents. **RESULTS:** Compared with a control group who viewed relaxing videotapes, the massaged subjects were less depressed and anxious and had lower saliva cortisol levels after the massage. In addition, nurses rated the subjects as being less anxious and more cooperative on the last day of the study, and nighttime sleep increased over this period. Finally, urinary cortisol and norepinephrine levels decreased, but only for the depressed subjects.

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### **Dermatitis**

Anderson, C., Lis-Balchin, M., & Kirk-Smith, M. (2000). Evaluation of massage with essential oils on childhood atopic eczema. *Phytotherapy Research*, 14, 452-6.

**METHODS:** Eight children, born to professional working mothers were studied to test the hypothesis that massage with essential oils (aromatherapy) used as a complementary therapy in conjunction with normal medical treatment, would help alleviate the symptoms of childhood atopic eczema. The children were randomly assigned to a massage and a massage with essential oils group. They received massage once a week by a therapist and every day by the mother over a period of 8 weeks. The preferred essential oils, chosen by the mothers for their child, from 36 commonly used aromatherapy oils, were: sweet marjoram, frankincense, German chamomile, myrrh, thyme, benzoin, spike lavender and Litsea cubeba. The treatments were evaluated by means of daily day time irritation scores and night time disturbance scores, determined by the mother before and during the treatment, both over an 8 week period. **RESULTS:** The results showed a significant improvement in the eczema in the two groups of children following therapy, but there was no significant difference in improvement shown between the aromatherapy massage and massage only group. Further studies on the essential oil massage group showed a deterioration in the eczematous condition after two further 8 week periods of therapy, following a period of rest after the initial period of contact. This may have been due to a decline in the novelty of the treatment, or, it strongly suggests possible allergic contact dermatitis provoked by the essential oils themselves.

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Schachner, L., Field, T., Hernandez-Reif, M., Duarte, A. & Krasnegor, J. (1998). Atopic dermatitis symptoms decreased in children following massage therapy. *Pediatric Dermatology*, 15, 390-395.

**METHOD:** Young children with atopic dermatitis were treated with standard topical care and massage by their parents for 20 minutes daily for a 1 month period. A control group received standard topical care only. **RESULTS:** The children's affect and activity level significantly improved, and their parents' anxiety decreased immediately after the massage therapy sessions. Over the 1 month period, the parents of the massaged children reported lower anxiety levels in their children, and the children improved significantly on all clinical measures including redness, scaling, lichenification, excoriation, and pruritus. The control group only improved significantly on the scaling measure.

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## Diabetes

Field, T., Hernandez-Reif, M., LaGreca A., Shaw, K., Schanberg, S., & Kuhn, C. (1997). Massage therapy lowers blood glucose levels in children with Diabetes Mellitus. *Diabetes Spectrum*, 10, 237-239.

**METHOD:** Twenty diabetic children were randomly assigned to a touch therapy or relaxation therapy group. The children's parents were taught one or the other therapy and were asked to provide them for 20 minutes before bedtime each night for 30 days.

**RESULTS:** The immediate effects of the touch therapy were reduced parent anxiety and depressed mood and reduced child anxiety, fidgetiness and depressed affect. Over the 30 day period compliance on insulin and food regulation improved and blood glucose levels decreased from 159 to within the normal range (121).

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## Diarrhea

Jump, V.K. Fargo, J.D. & Akers, J. (2006). Impact of massage therapy on health outcomes among orphaned infants in Ecuador: results of a randomized clinical trial. *Family Community Health, 29*, 314-9.

Diarrhea is the second leading cause of death among infants and young children in the developing world. This project investigated whether therapeutic infant massage could reduce diarrheal episodes and decrease overall illness of infants. **METHOD:** Infants living in 2 orphanages in Quito, Ecuador, were matched by age and randomly assigned to a massage therapy or a control group. Daily infant massage therapy was provided by orphanage staff or volunteers, which lasted an average of 53 days, and symptoms of illness data were documented daily by volunteers in the orphanages. **RESULTS:** the control group infants had a 50% greater risk of having diarrhea than experimental infants. Control group infants were also 11% more likely than experimental infants to experience illness of any kind.

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## Down Syndrome

Hernandez-Reif, M., Field, T., Bornstein, J. & Fewell, R. (2006). Children with Down Syndrome improved in motor function and muscle tone following massage therapy. *Journal of Early Child Development and Care, 176*, 395-410..

**METHOD:** Twenty-one moderate to high functioning young children (M age = 2 years) with Down syndrome receiving early intervention (PT, OT and speech therapy) were randomly assigned to also receive two ½-hour massage therapy or reading sessions (control group) per week for two months. On the first and last day of the study, the children were assessed on functioning using the Developmental Programming for Infants and Young Children Scale and muscle tone using a new Likert scale. **RESULTS:** Children in the massage therapy group experienced developmental gains in fine and gross motor functioning and showed less severe hypotonicity in their limbs. These findings

suggest that the addition of massage therapy to an early intervention program may enhance motor and muscle functioning for children with Down syndrome.

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### Infants

Cullen, C., Field, T., Escalona, A. & Hartshorn, K. (2000). Father-infant interactions are enhanced by massage therapy. *Early Child Development and Care*, 164, 41-47.

**METHOD:** Fathers gave their infants daily massages 15 minutes prior to bedtime for one month. **RESULTS:** By the end of the study, the fathers who massaged their infants were more expressive and showed more enjoyment and more warmth during interactions with their infants.

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Ferber, S.G., Laudon, M., Kuint, J., Weller, A., & Zisapel, N. (2002). Massage therapy by mothers enhances the adjustment of circadian rhythms to the nocturnal period in full-term infants. *Journal of Developmental and Behavioral Pediatrics*, 23, 410-415.

**METHOD:** This study investigated the effect of massage therapy on phase adjustment of rest-activity and melatonin secretion rhythms to the nocturnal period in full-term infants.

Rest-activity of infants was measured by actigraphy before and after 14 days of massage therapy (starting at approximately age 10 days) and subsequently at 6 and 8 weeks of age. Melatonin was assessed in urine samples at 6, 8, and 12 weeks of age. **RESULTS:** At 8 weeks the controls revealed 1 peak of activity at approximately 12 midnight and another one at approximately 12 noon, whereas in the treated group, a major peak was early in the morning and a secondary peak in the late afternoon. At 12 weeks, nocturnal melatonin excretions were significantly higher in the treated infants. Thus, massage therapy by mothers in the perinatal period serves as a strong time cue, enhancing coordination of the developing circadian system with environmental cues.

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Field, T. & Hernandez-Reif, M. (2001). Sleep problems in infants decrease following massage therapy. *Early Child Development and Care*, 168, 95-104.

**METHOD:** Infants and toddlers (mean age=1.5 years) with sleep onset problems were given daily massages by their parents for 15 minutes prior to bedtime for 1 month. **RESULTS:** Based on parent diaries, the massaged versus the control children (who were read bedtime stories) showed fewer sleep problems and had a shorter latency to sleep onset by the end of the study. Forty-five minute behavior observations by an independent observer also revealed more time awake, alert and active and more positive affect in the massaged children by the end of the study.

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Field, T., Grizzle, N., Scafidi, F., Abrams, S., & Richardson, S. (1996). Massage therapy for infants of depressed mothers. *Infant Behavior and Development* 19, 109-114.

**METHOD:** Forty full-term 1- to 3-month-old infants born to depressed adolescent mothers who were low socioeconomic status (SES) and single parents were given 15 minutes of either massage or rocking for 2 days per week for a 6-week period. **RESULTS:** The infants who experienced massage therapy compared to infants in the rocking control group spent more time in active alert and active awake states, cried less, and had lower salivary cortisol levels, suggesting lower stress. After the massage versus the rocking sessions, the infants spent less time in an active awake state, suggesting that massage may be more effective than rocking for inducing sleep. Over the 6-week period, the massage-therapy infants gained more weight, showed greater improvement on emotionality, sociability, and soothability temperament dimensions and had greater decreases in urinary stress catecholamines/hormones (norepinephrine, epinephrine, cortisol).

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Huhtala, V., Lehtonen, L., Heinonen, R., & Korvenranta, H. (2000). Infant massage compared with crib vibrator in the treatment of colicky infants. *Pediatrics*, 105, E84.

**METHOD:** This study evaluated the effectiveness of infant massage as compared to a crib vibrator in the treatment of infantile colic. Infants <7 weeks of age and perceived as colicky by their parents were randomly assigned to an infant massage group (n = 28) or a crib vibrator group (n = 30). Three daily intervention periods were recommended in both groups. Parents recorded infant crying and interventions given in a structured cry diary that was kept for 1 week before (baseline) and for 3 weeks during the intervention.

**RESULTS:** Over the 4-week study, the amount of total and colicky crying decreased significantly in both intervention groups. Ninety-three percent of the parents in both groups reported that colic symptoms decreased over the 3-week intervention.

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Kim, T.I., Shin, Y.H., & White-Traut, R.C. (2003). Multisensory intervention improves physical growth and illness rates in Korean orphaned newborn infants. *Res Nurs Health*, 26, 424-33.

**METHOD:** The purpose of this study was to evaluate the effectiveness of a multisensory intervention on the physical growth and health of Korean orphaned infants. Fifty-eight full-term infants were randomly assigned to a control or an experimental group within 14 days postbirth. In addition to receiving the routine orphanage care, infants in the experimental group received 15 min of auditory (female voice), tactile (massage), and visual (eye-to-eye contact) stimulation twice a day, 5 days a week, for 4 weeks.

**RESULTS:** Compared to the control group, the experimental group gained significantly more weight and had larger increases in length and head circumference after the 4-week intervention period and at 6 months of age. In addition, the experimental group had significantly fewer illnesses and clinic visits.

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Scafidi, F. and Field, T. (1996). Massage therapy improves behavior in neonates born to HIV-positive mothers. *Journal of Pediatric Psychology*, 21, 889-897.

**METHOD:** 28 neonates born to HIV-positive mothers were randomly assigned to a massage therapy or control group. The treatment infants were given three 15-minute massages daily for 10 days. **RESULTS:** The massaged group showed superior performance on almost every Brazelton newborn cluster score and had a greater daily weight gain at the end of the treatment period, unlike the control group who showed declining performance.

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Scholtz, K., & Samuels, C. A. (1992). Neonatal bathing and massage intervention with fathers: Behavioral effects 12 weeks after birth of the first baby. *International Journal of Behavioral Development*, 15, 67-81.

**METHOD:** Australian families with first-born babies were studied for effects of a 4-week-postpartum training program (demonstration of baby massage and the Burleigh Relaxation Bath technique), with emphasis on the father-infant relationship. 16 families were assigned to the treatment group and 16 served as controls. **RESULTS:** At the 12-week home observation, the treatment group infants greeted their fathers with more eye contact, smiling, vocalizing, reaching, and orienting responses and showed less avoidance behaviors. During a 10-min observation, the treatment group fathers showed greater involvement with their infants.

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### **Infants Massage Review Papers**

Field, T. (1995). Massage therapy for infants and children. [Review]. *Journal of Developmental & Behavioral Pediatrics*, 16, 105-111.

Data are reviewed on the effects of massage therapy on infants and children with various medical conditions. The infants include: premature infants, cocaine-exposed infants, HIV-exposed infants, infants parented by depressed mothers, and full-term infants without medical problems. The childhood conditions include: abuse (sexual and physical), asthma, autism, burns, cancer, developmental delays, dermatitis, diabetes, eating disorders (anorexia and bulimia), juvenile rheumatoid arthritis, posttraumatic stress disorder, and psychiatric problems. Generally, the massage therapy has resulted in lower anxiety and stress hormones and improved clinical course. Having grandparent volunteers and parents give the therapy enhances their own wellness and provides a cost-effective treatment for the children.

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Field, T. (2000). Infant massage therapy (Review).. In Zeanah, Charles H. Jr. (Ed), *Handbook of infant mental health* (2nd ed.). (pp. 494-500). New York, NY, US: Guilford Press.

**REVIEW:** The author describes infant massage as a therapeutic intervention. She points to its worldwide popularity and to a small but growing body of literature suggesting its

efficacy. Her review makes clear that it provides ample opportunities for infant-caregiver change. This approach may be a primary intervention in some settings and a useful adjunct in others.

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Uvnas-Moberg, K., Widstrom, A. M., Marchini, G., and Winberg, J. (1987). Release of GI hormones in mother and infant by sensory stimulation. [Review]. *Acta Paediatrica Scandinavia*, 76, 851-860.

**REVIEW:** Sensory stimulation is of great importance for the growth and the physiological and psychological development of infants. Supplementary sensory stimulation such as non-nutritive sucking and tactile stimulation has been shown to increase the growth rate and the maturation of premature infants. In human neonates non-nutritive sucking has a vagally mediated influence on the levels of some gastrointestinal hormones. In animal experiments afferent electrical stimulation of the sciatic nerve at low intensity leads to an activation of the vagal nerve and to a consequent release of vagally controlled gastrointestinal hormones such as gastrin and cholecystokinin. We therefore assume that both non-nutritive sucking and tactile stimulation trigger the activity of sensory nerves which leads to a release of vagally regulated gut hormones. Since gut hormones stimulate gastrointestinal motor and secretory activity and the growth of the gastrointestinal tract, and enhance the glucose-induced insulin release, they may contribute to the beneficial effects on maturation and growth caused by sensory stimulation. In the breast-feeding situation, the sucking of the child elicits similar reflexes in the mother leading to an activation of the maternal gut endocrine system and a consequent increase in energy uptake.

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Shor-Posner, G., Hernandez-Reif, M., Miguez, M., Fletcher, M., Quintero, N., Baez, J., Perez-Then, E. Soto, S., Mendoza, R., Castillo, R. & Zhang, G. (2006). Impact of a massage therapy clinical trial on immune status in young Dominican children infected with HIV-1. *Journal of Alternative and Complementary Medicine*, 12, 511-6.

**METHODS:** Dominican HIV+ children without current access to antiretroviral therapies were randomized to receive either massage or a control/friendly visit twice weekly for 12 weeks. Blood was drawn at baseline and following the 3-month intervention for determinations of the HIV disease markers CD4 and CD8 cell counts. **RESULTS:** Despite similar immune parameters at baseline in the two groups, significantly more of the control group exhibited a decline in CD4 cell count postintervention. The decrease was particularly evident in older (5-8 years) children in the control group, who demonstrated a significant reduction in both CD4 and CD8 cell counts compared to massage-treated older children who remained stable or showed immune improvement. Additionally, a significant increase in CD4 cells was observed over the 12-week trial in

the massage-treated older children but not in the control group. In younger massage-treated children, (2-4 years old), a significant increase in natural killer cells was shown.

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### **Leukemia**

Field, T., Cullen, C., Diego, M., Hernandez-Reif, M., Sprinz, P., Beebe, K., Kissel, B., & Bango-Sanchez, V. (2001). Leukemia immune changes following massage therapy. *Journal of Bodywork and Movement Therapies*, 5, 271-274.

**METHOD:** Twenty children with leukemia were provided with daily massage therapy by their parents and were compared to a standard treatment control group. **RESULTS:** Following a month of massage therapy, depressed mood decreased in the children's parents, and the children's white blood cell and neutrophil counts decreased.

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### **Oxytocin**

Agren, C., Lundeberg, T., Uvnas-Moberg, K., & Sato, A. (1995). The oxytocin antagonist 1-deamino-2-D-Tyr-(Oet)-4-Thr-8-Orn-oxytocin reverses the increase in the withdrawal response latency to thermal, but not mechanical nociceptive stimuli following oxytocin administration or massage-like stroking in rats. *Neuroscience Letters*, 18, 49-52.

**METHOD:** In this study the effect of exogenous oxytocin and of massage-like stroking on the withdrawal latency responses to heat and mechanical nociceptive stimulation were investigated in rats. A hot-plate test was used to assess withdrawal responses. **RESULTS:** Exogenous oxytocin and stroking (a low frequency mechanical stimulation) significantly increased the withdrawal latencies in response to mechanical and to thermal nociceptive stimuli. The effect of oxytocin and of stroking on the hot-plate test was reversed by an oxytocin antagonist directed against the uterine receptor. In contrast, the antagonist did not affect the prolonged response latency in the mechanical nociceptive stimulation test following either exogenous oxytocin or stroking. These results support the view that (1) oxytocin administration affects directly nociceptive-related behavior in response to heat stimulation, and (2) massage-like stroking may have an anti-nociceptive effect via activation of oxytocinergic mechanisms. Since the response to mechanical stimulation was not blocked by the antagonist, the mechanisms mediating the withdrawal latency to heat and mechanical stimulation could be different.

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Kurosawa, M., Lundeberg, T., Agren, G., Lund, I., and Uvnas-Moberg, K. (1995). Massage-like stroking of the abdomen lowers blood pressure in anesthetized rats: influence of oxytocin. *Journal of the Autonomic Nervous System*, 56, 26-30.

**METHOD:** The aim of this study was to determine how massage-like stroking of the abdomen in rats influences arterial blood pressure. The participation of oxytocinergic mechanisms in this effect was also investigated. The ventral and/or lateral sides of the abdomen were stroked in anesthetized, artificially ventilated rats. Arterial blood pressure was recorded with a pressure transducer via a catheter in the carotid artery. **RESULTS:** Stroking of the ventral, or both ventral and lateral sides of the abdomen for one minute caused a marked decrease in arterial blood pressure. After cessation of the stimulation blood pressure returned to the control level within 1 min. Stroking only the lateral sides of the abdomen elicited a significantly smaller decrease in blood pressure than stroking the ventral side. The decrease in blood pressure caused by stroking was not altered by an oxytocin antagonist. In contrast, the administration of oxytocin diminished the effect, which was antagonized by a simultaneous injection of the oxytocin antagonist. These results indicate that the massage-like stroking of the abdomen decreases blood pressure in anesthetized rats. This effect does not involve intrinsic oxytocinergic transmission. However, since exogenously applied oxytocin was found to diminish the effect of stroking, oxytocin may exert an inhibitory modulatory effect on this reflex arc.

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Matthiesen, A.S., Ransjo-Arvidson, A.B., Nissen, E. & Uvnas-Moberg, K. (2001). Postpartum maternal oxytocin release by newborns: effects of infant hand massage and sucking. *Birth*, 28, 13-9.

**METHODS:** Hand movements and sucking behavior were studied in healthy term newborns who were placed skin-to-skin on their mothers' chests, as well as maternal oxytocin release. Ten vaginally delivered infants whose mothers had not been exposed to maternal analgesia were video-recorded from birth until the first breastfeeding. **RESULTS:** Infants used their hands to explore and stimulate their mother's breast in preparation for the first breastfeeding. When the infants were sucking, the massagelike hand movements stopped and started again when the infants made a sucking pause. Periods of increased massagelike hand movements or sucking of the mother's breast were followed by an increase in maternal oxytocin levels.

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**Pain**

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**Parkinson's**

Hernandez-Reif, M., Field, T., Largie, S., Cullen, C., Beutler, J., Sanders, C., Weiner, W., Rodriguez-Bateman, D., Zelaya, L., Schanberg, S. & Kuhn, C. (2002). Parkinson's disease symptoms are reduced by massage therapy and progressive muscle exercises. *Journal of Bodywork and Movement Therapies*, 6, 177-182.

**METHOD:** Sixteen adults diagnosed with idiopathic Parkinson's Disease, received 30-minute massage therapy or progressive muscle relaxation sessions twice a week for five weeks (10 sessions total). **RESULTS:** Physicians rated massage therapy participants as improved in daily living activities by the end of the study. Participants also rated themselves as improved in daily functioning including having more effective and less disturbed sleep.

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### Posttraumatic Stress

Field, T., Seligman, S., Scafidi, F., & Schanberg, S. (1996). Alleviating posttraumatic stress in children following Hurricane Andrew. *Journal of Applied Developmental Psychology*, 17, 37-50.

**METHOD:** Massage therapy was evaluated for the reduction of anxiety and depression levels of children as measured by behavioral observations, their drawings, and their cortisol levels. Sixty 1st-5th graders who showed classroom behavior problems following Hurricane Andrew were randomly assigned to a massage therapy or a video attention group. **RESULTS:** Scores on the Posttraumatic Stress Disorder Index suggest that the subjects were experiencing severe posttraumatic stress. Subjects who received massage reported being happier and less anxious and had lower salivary cortisol levels after the therapy than the video subjects. The massage group showed more sustained changes as manifested by lower scores for anxiety, depression, and self-drawings. The massage therapy subjects were also observed to be more relaxed.

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### Preschool Massage

Field, T., Kilmer, T., Hernandez-Reif, M. & Burman, I. (1996). Preschool children's sleep and wake behavior: Effects of massage therapy. *Early Child Development and Care*, 120, 39-44.

**METHOD:** Preschool children received 20-minute massages twice a week for five weeks. **RESULTS:** The massaged children as compared to children in the wait-list control group had better behavior ratings on state, vocalization, activity and cooperation after the massage sessions on the first and last days of the study. Their behavior was also rated more optimally by their teachers by the end of the study. Also, at the end of the 5 week period parents of the massaged children rated their children as having less touch

aversion and being more extraverted. Finally, the massaged children had a shorter latency to naptime sleep by the end of the study.

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Hart, S.; Field, T.; Hernandez-Reif, M.; & Lundy, B. (1998). Preschoolers' cognitive performance improves following massage. *Early Child Development and Care, 143*, 59-64.

**METHOD:** This study examined the effects of massage therapy on the cognitive performance of preschool students on the Block Design, Animal Pegs, and Mazes subtests of the Wechsler Preschool and Primary Scale of Intelligence (WPPSI) prior to and following a 15-min massage. **RESULTS:** Children's scores on the Block Design test of abstract reasoning improved following massage. Massage was particularly beneficial to children rated as high-strung and anxious.



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### Preterm Infants

Aly, H., Moustafa, M.F., Hassanein, S.M., Massaro, A.N., Amer, H.A., & Patel, K. (2004). Physical activity combined with massage improves bone mineralization in the premature infants: a randomized trial. *J Perinatol., 24*, 305-9.

**METHOD:** Osteopenia of prematurity is a known source for morbidity in preterm infants. Premature infants have shown favorable outcomes in response to massage and physical activity. This study tested the hypothesis that massage combined with physical activity can stimulate bone formation and ameliorate bone resorption in premature infants. Thirty preterm infants were randomly assigned to either a control group or intervention group. Infants in the intervention group received a daily protocol of combined massage and physical activity. Serum type I collagen C-terminal propeptide (PICP) and urinary pyridinoline crosslinks of collagen (Pyd) were used as indices for bone formation and resorption, respectively. **RESULTS:** In the control group, serum PICP decreased over time, while urinary Pyd increased indicating decreased bone

formation and increased bone resorption, respectively. In the intervention group, serum PICP increased over time. Urinary Pyd also increased over time. A combined massage and physical activity protocol improved bone formation (PICP) but did not affect bone resorption (Pyd).

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Dieter, J., Field, T., Hernandez-Reif, M., Emory, E.K., & Redzepi, M. (2003). Stable preterm infants gain more weight and sleep less after five days of massage therapy. *Journal of Pediatric Psychology*, 28, 403-11.

**METHOD:** To determine whether a shorter course of massage therapy leads to greater weight gain in grower nursery preterm infants, massage therapy was provided for preterm neonates over 5 days. **RESULTS:** Massaged infants gained 47% more weight per day than control infants.

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Ferber, S.G. Kuint, J., Weller, A., Feldman, R., Dollberg, S., Arbel, E., & Kohelet D. (2002). Massage therapy by mothers and trained professionals enhances weight gain in preterm infants. *Early Human Development*, 37, 37-45.

**METHOD:** This study compared maternal and nonmaternal administration of massage therapy to preterm infants. Healthy, preterm infants assigned to three groups: two treatment groups--one in which the mothers performed the massage, and the other in which a professional female unrelated to the infant administered the treatment. Both these groups were compared to a control group. **RESULTS:** Over the 10-day study period, the two treatment groups gained significantly more weight compared to the control group.

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Field, T. (2001). (Review). Massage therapy facilitates weight gain in preterm infants. *Current Directions in Psychological Science*, 10, 51-54.

**REVIEW:** Studies from several labs have documented a 31 to 47% greater weight gain in preterm newborns receiving massage therapy (3 15-min. sessions for 5-10 days) compared with standard medical treatment. Although the underlying mechanism for this relationship between massage therapy and weight gain has not yet been established, possibilities that have been explored in studies with both humans and rats include (1) increased protein synthesis, (2) increased vagal activity that releases food-absorption hormones like insulin and enhances gastric motility, and (3) decreased cortisol levels leading to increased oxytocin. In addition, functional magnetic resonance imaging studies are being conducted to assess the effects of touch therapy on brain development.

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Field, T., Scafidi, F., and Schanberg, S. (1987). Massage of preterm newborns to improve growth and development. *Pediatric Nursing, 13*, 385-387.

**METHOD:** The data reviewed here suggest that the growth and development of preterm neonates can be facilitated by tactile-kinesthetic stimulation. **RESULTS:** Greater weight gain and superior performance on developmental assessments persisted across the first 6 months for the group of infants that received the massage treatment. These enduring effects may be mediated by better parent-infant interactions. Heightened responsiveness of the neonate may enhance the early parent-infant relationships which may, in turn, contribute to optimal growth and development at later stages in infancy.

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Field, T. & Schanberg, S. M. (1990). Massage alters growth and catecholamine production in preterm newborns. Gunzenhauser, N., Brazelton, T. B., and Field, T. Johnson & Johnson. *Advances in Touch*. Skillman, N. J.

**METHOD:** Forty medically stable preterm neonates received tactile/kinesthetic stimulation for three 15-minute periods during three consecutive hours every day for ten days. **RESULTS:** Despite similar formula and caloric intake, the treatment infants averaged a 21 percent greater daily weight gain than the control infants over the treatment period. In addition, the treatment group showed superior performance on the NBAS on the habituation cluster following the treatment period, and less time in active sleep and less facial grimacing, mouthing/yawning, and clenched fists.

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Field, T., Schanberg, S., Scafidi, F., Bauer, C., Vega-Lahr, N., Garcia, R., Nystrom, J., & Kuhn, C. (1986). Tactile/kinesthetic stimulation effects on preterm neonates. *Pediatrics, 77*, 654-658.

**METHOD:** Tactile/kinesthetic stimulation was given to 20 preterm neonates (mean gestational age, 31 weeks; mean birth weight, 1,280 g; mean time in neonatal intensive care unit, 20 days) during transitional ("grower") nursery care, and their growth, sleep-wake behavior, and Brazelton scale performance was compared with a group of 20 control neonates. The tactile/kinesthetic stimulation consisted of body stroking and passive movements of the limbs for three, 15-minute periods per day for 10 days. **RESULTS:** The stimulated neonates averaged a 47% greater weight gain per day (mean 25 g versus 17 g), were more active and alert during sleep/wake behavior observations, and showed more mature habituation, orientation, motor, and range of state behavior on the Brazelton scale than control infants. Finally, their hospital stay was 6 days shorter, yielding a cost savings of approximately \$3,000 per infant. These data suggest that tactile/kinesthetic stimulation may be a cost effective way of facilitating growth and behavioral organization even in very small preterm neonates.

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Jain, S., Kumar, P. & Kumar, P. (2006). Prior leg massage decreases pain responses to heel stick in preterm babies. *Journal of Paediatric and Child Health*, 42, 505-8

**METHOD:** 13 infants received a 2-min massage of the ipsilateral leg prior to heel stick on the first study sampling and no massage on the next sampling 2-7 days later and 10 infants had the reverse order. The bedside nurse, blinded to the intervention, measured pain, heart rate, respiratory rate, and oxygen saturation prior to massage, after massage, and 5 min after the heelstick. Serum cortisol was measured with the blood sampling.

**RESULTS:** In 23 infants there were no adverse physiologic effects of massage. After heel stick, pain and heart rate were increased in the no-massage group compared with the massage group.

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Kuhn, C., Schanberg, S., Field, T., Symanski, R., Zimmerman, E., Scafidi, F., and Roberts, J. (1991). Tactile kinesthetic stimulation effects on sympathetic and adrenocortical function in preterm infants. *Journal of Pediatrics*, 119, 434-440.

**METHOD:** The purpose of this study was to investigate the neuroendocrine response in preterm infants to a pattern of tactile-kinesthetic stimulation that facilitates their growth and development. Preterm infants (mean gestational age 30 weeks, mean birth weight 1176 gm) received normal nursery care or tactile-kinesthetic stimulation for three 15 minute periods at the start of three consecutive hours each day for 10 days. On day 1 and day 10 of the study, a 24-hour urine sample was collected for norepinephrine, epinephrine, dopamine, cortisol, and creatinine assays and a blood sample was taken by heelstick for cortisol and growth hormone assays. **RESULTS:** Urine norepinephrine and epinephrine values increased significantly only in the stimulated babies. Urine dopamine and cortisol values increased in both groups, and serum growth hormone decreased in both groups. Individual differences in urine norepinephrine, epinephrine, dopamine, and cortisol values were highly stable across the 10 days despite a 10-fold range of values among the infants. The results of this study suggest that tactile-kinesthetic stimulation of preterm infants has a fairly specific effect on maturation and/or activity of the sympathetic nervous system. In addition, this study has defined catecholamine and cortisol secretion across gestational age in normal preterm infants. Finally, these data suggest that highly stable individual levels of catecholamine and cortisol secretion are established by birth in humans.

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Mainous, R.O. (2002). Infant massage as a component of developmental care: past, present, and future. *Holistic Nursing Practice*, 16, 1-7.

**REVIEW:** Infant massage has been practiced for centuries by segments on the continents of Africa and South America and in the Far East. Infant massage is a relatively new modality in North America. Numerous studies support its use in preterm infants, who

have exhibited decreased stress levels, increased weight gain, and improved motor function when compared with non-massaged controls. Research has recently turned to the benefits of massage in

the cocaine-exposed population and in those with human immunodeficiency virus. Massage in ill preterms has been targeted for clinical testing.

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Mathai, S., Fernandez, A., Mondkar, J., & Kanbur, W. (2002). Effects of tactile-kinesthetic stimulation on preterms: a controlled trial. *Indian Pediatrics*, 38, 1091-1098.

**METHOD:** The objective of this study was to determine the effects of tactile-kinesthetic stimulation on preterms on physiologic parameters, physical growth and behavioral development. Forty-eight well preterms with birthweights between 1000-2000 grams were randomly assigned to treatment and control groups. Treatment babies received tactile-kinesthetic stimulation in the form of a structured baby massage from day 3 to term corrected age. They were observed for changes in vital parameters (heart rate, respiration, temperature and oxygen saturation) during the first few days of stimulation in hospital. Thereafter, massage was continued at home. Changes in weight, length and head circumference and neuro-behavior (Brazelton Neuro-Behavioral Assessment Scale) were assessed in both groups before, during and after the study period. **RESULTS:** An increase in heart rate (within physiologic range) was seen in the treatment group during stimulation. This group also showed a weight gain of 4.24 g/day more than controls. On the Brazelton Scale the massaged group showed improved scores on the "orientation", "range of state", "regulation of state" and "autonomic stability" clusters at follow-up.

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Morrow, C. J., Field, T., Scafidi, F. A., Roberts, J., Eisen, L., Larson, S.K., Hogan, A.E., & Bandstra, E.S. (1991). Differential effects of massage and heelstick procedures on transcutaneous oxygen tension in preterm neonates. *Infant Behavior and Development*, 14, 397-414.

**METHOD:** This study investigated the effects of heelsticks and tactile-kinesthetic massage on transcutaneous oxygen tension (TcPO<sub>2</sub>) in 47 stabilized preterm neonates (average gestational age 30 weeks). **RESULTS:** During the heelstick procedure, TcPO<sub>2</sub> significantly declined an average of 14 mmHg. When compared with the tactile-kinesthetic massage, TcPO<sub>2</sub> levels during the heelstick were significantly lower than during the stimulation. Mean TcPO<sub>2</sub> levels remained clinically safe during the 4 massage sessions. The TcPO<sub>2</sub> levels during kinesthetic stimulation were somewhat more varied, and movement and pressurization of the TcPO<sub>2</sub> electrode were investigated as possible artifactual explanations for this phenomenon. Overall, findings indicate that social forms of touch such as tactile-kinesthetic massage do not appear to have a medically compromising effect on TcPO<sub>2</sub> in the preterm neonate. Findings are evaluated in relation to the "minimal touch" policy.

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Scafidi, F., Field, T., Schanberg, S., Bauer, C., Vega-Lahr, N., & Garcia, R. (1986). Effects of tactile/kinesthetic stimulation on the clinical course and sleep/wake behavior of preterm neonates. *Infant Behavior and Development*, 9, 91-105.

**METHOD:** Forty preterm neonates treated in an intensive care nursery (M gestational age = 31 weeks, M birthweight = 1274 gms) were randomly assigned to a treatment or control group. The treatment infants received tactile/kinesthetic stimulation (body massage and passive movements of the limbs) for three 15-minute periods during three consecutive hours for a 10-day period. At the end of the treatment period the behavioral states and activity level of the neonates were monitored during sleep/wake behavior observations. In addition, neonatal behaviors were assessed on the Brazelton scale.

**RESULTS:** The treated infants averaged a 47% greater weight gain per day (25 vs. 17 grams), and spent more time awake and active during sleep/wake behavior observations.

On the Brazelton scale the treated infants showed more mature orientation, motor, habituation, and range of state behaviors. Finally, the treated infants were discharged 6 days earlier, yielding hospital cost savings of \$3,000 per infant.

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Scafidi, F.A., Field, T.M., Schanberg, S.M., Bauer, C.R., Tucci, K., Roberts, J., Morrow, C., & Kuhn, C.M. (1990). Massage stimulates growth in preterm infants: A replication. *Infant Behavior and Development*, 13, 167-188.

**METHOD:** Forty preterm infants (M gestational age = 30 weeks; M birthweight = 1176 gms; M duration ICU care = 14 days) were assigned to treatment and control groups once they were considered medically stable. Assignments were based on a random stratification of gestational age, birthweight, intensive care duration, and study entrance weight. The treatment infants (n = 20) received tactile/kinesthetic stimulation for three 15-minute periods during 3 consecutive hours per day for a 10-day period. Sleep/wake behavior was monitored and Brazelton assessments were performed at the beginning and at the end of the treatment period. **RESULTS:** The treated infants averaged a 21% greater weight gain per day (M=34 vs. 28 gms) and were discharged 5 days earlier. No significant differences were demonstrated in sleep/wake states and activity level between the groups. The treated infants' performance was superior on the habituation cluster items of the Brazelton scale. Finally, the treatment infants were more active during the stimulation sessions than during the nonstimulation observation sessions (particularly during the tactile segments of the sessions).

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Scafidi, F. A., Field, T., & Schanberg, S. M. (1993). Factors that predict which preterm infants benefit most from massage therapy. *Journal of Developmental & Behavioral Pediatrics, 14*, 176-180.

**METHOD:** Ninety-three preterm infants (M gestational age = 30 weeks; M birthweight = 1204 g; M ICU duration = 15 days) were randomly assigned to a massage therapy group or a control group once they were considered medically stable. The treatment group (N = 50) received three daily 15-minute massages for 10 days. **RESULTS:** The massage therapy infants gained more weight per day (M=32 vs. 29 g) than the control infants. The treatment and control groups were divided into high and low weight gainers based on the average weight gain for the control group. Seventy percent of the massage therapy infants were classified as high weight gainers whereas only 40% of the control infants were classified as high weight gainers. Discriminant function analyses determining the characteristics that distinguished the high from the low weight gainers suggested that the control infants who, before the study, consumed more calories and spent less time in intermediate care gained more weight. In contrast, for the massage therapy group, the pattern of greater caloric intake and more days in intermediate care before the study period along with more obstetric complications differentiated the high from the low weight gainers, suggesting that the infants who had experienced more complications before the study benefited more from the massage therapy. These variables accurately predicted 78% of the infants who benefited more from the massage therapy.

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### Preterm Infant Review

Field, T. (1992). Interventions in early infancy. Special Section: Australian Regional Meeting: Attachment and the relationship between the infant and caregivers. *Infant Mental Health Journal, 13*, 329-336.

**REVIEW:** This review describes 3 interventions to help infants of high-risk pregnancies and deliveries facilitate attachment both to and from their caregivers. Prenatal

intervention included giving high-risk pregnant women video feedback during prenatal ultrasound, which reduced maternal anxiety, obstetric complications, and fetal activity and improved neonatal outcome (increased weight gain, better performance on the Brazelton Neonatal Behavioral Assessment Scale, and decreased irritability). Intervention aimed at reducing stress in the neonatal intensive care unit included providing preterm neonates nonnutritive sucking opportunities to reduce stress during heelsticks and gavage feedings and providing preterm neonates and preterm cocaine-exposed neonates massage therapy, which facilitated weight gain and better performance on the Brazelton scale.

Following improved neonatal behavior, infants would be expected to have better interactions with their caregivers.

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Field, T. (2001). Massage therapy facilitates weight gain in preterm infants. *Current Directions in Psychological Science*, 10, 51-54.

**REVIEW:** Studies from several labs have documented a 31 to 47% greater weight gain in preterm newborns receiving massage therapy (three 15-minute sessions for 5-10 days) compared with standard medical treatment. Although the underlying mechanism for this relationship between massage therapy and weight gain has not yet been established, possibilities that have been explored in studies with both humans and rats include (a) increased protein synthesis, (b) increased vagal activity that releases food-absorption hormones like insulin and enhances gastric motility and (c) decreased cortisol levels leading to increased oxytocin. In addition, functional magnetic resonance imaging studies are being conducted to assess the effects of touch therapy on brain development. Further behavioral, physiological, and genetic research is needed to understand these effects of massage therapy on growth and development.

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Field, T. (2002). Massage therapy. *Medical Clinics of North America*, 86, 163-71.

**REVIEW:** The author and other investigators have documented improvement in several medical and psychiatric conditions after massage therapy, including growth in preterm infants, depression and addictive problems, pain syndromes, and immune and autoimmune conditions. Although some potential underlying mechanisms have been explored for the massage therapy-improved clinical condition relationship, including decreased stress (and decreased cortisol), improved sleep patterns, and enhanced immune function, further research is needed in this area.

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**Sexual Abuse**

Field, T., Hernandez-Reif, M., Hart, S., Quintino, O., Drose, L., Field, T., Kuhn, C., & Schanberg, S. (1997). Sexual abuse effects are lessened by massage therapy. *Journal of Bodywork and Movement Therapies, 1*, 65-69.

**METHOD:** Women (mean age = 35 years) who had experienced sexual abuse, were given a 30-minute massage twice a week for 1 month. **RESULT:** Immediately after the massage the women reported being less depressed and less anxious and their salivary cortisol levels decreased following the session. Over the 1-month treatment period the massage therapy group experienced a decrease in depression and in life event stress. Although the relaxation therapy control group also reported a decrease in anxiety and depression, their stress hormones did not change, and they reported an increasingly negative attitude toward touch.

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### Sleep

Field, T., Kilmer, T., Hernandez-Reif, M. & Burman, I. Preschool Children's Sleep and Wake Behavior: Effects of Massage Therapy. *Early Child Development and Care, 120*, 39-44.

**METHOD:** Preschool children received 20-minute massages twice a week for five weeks. **RESULTS:** The massaged children as compared to the children in the wait-list control group had better behavior ratings on state, vocalization, activity and cooperation after the massage sessions on the first and last days of the study. Their behavior was also rated more optimally by their teachers by the end of the study. Also, at the end of the 5 week period parents of the massaged children rated their children as having less touch aversion and being more extraverted. Finally, the massaged children had a shorter latency to naptime sleep by the end of the study.