

Massage Therapy Research: A Narrative Review

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Abstract

This narrative review on the massage therapy literature from the years 2020 to 2023 includes 49 studies. Many of these are focused on massage reducing prenatal depression and anxiety, increasing brain maturation in preterm neonates and on reducing jaundice in full-term newborns. Pediatric massage research has been focused on cerebral palsy and adult research on arthritis pain. Studies on older adults include the reduction of anxiety and depression in victims of stroke, Parkinson's and Alzheimer's. Other studies found positive effects of self-massage as well as couples' massage that suggests that both the massager and "massagee" experience reduced stress. Surprisingly, most of the entries in the literature have been proposed protocols for studies and only one has involved potential underlying mechanisms for the positive effects of massage therapy.

Massage Therapy Research: A Narrative Review

This narrative review involved entering the terms massage therapy and the years 2020-2023 into PubMed and PsycINFO. The search yielded 218 papers for the last four years. However, following exclusion criteria, including case studies, non-English papers and study protocols, this review is a summary of the research reported in 49 papers. The recent literature on massage therapy is predominantly focused on the reduction of prenatal depression and anxiety, the positive effects for preterm neonates in neonatal intensive care, on hyperbilirubinemia in full-term newborns, on pain in adults and on the lessening of depression in neurological conditions of late life. Other research involves comparisons of different types of massage including foot, hand and couples' massage. This narrative review is accordingly divided into sections on different age groups and different types of massage.

Prenatal Massage Therapy

Surprisingly, only two studies on prenatal massage could be found in this recent literature. They include a meta-analysis on pregnancy massage research and a randomized controlled study on labor massage (see Table 1).

Table 1: Prenatal massage therapy effects (and first authors).

Effects	First authors
Decreased prenatal depression and anxiety	Hall
Decreased labor pain	Gonenc

Pregnancy massage reduces depression and anxiety

In a recent meta-analysis on eight studies, moderate effects were noted on the reduction of prenatal depression based on depression scale (CES-D) scores and on prenatal anxiety based on different measures [1]. These are important findings that are consistent with earlier studies on the positive effects of massage therapy on prenatal depression [2]. The prevalence of prenatal depression and the deleterious effects of prenatal depression on birthweight and prematurity highlight the importance of adopting prenatal massage into practice [2].

Labor massage alleviates pain

In a study entitled "Effects of massage on relieving labor pain, reducing labor time and increasing delivery satisfaction", a randomized controlled trial (N=120) assessed the effects of massage, acupressure, and massage plus acupressure on labor (Gonenc et al, 2030). As might be expected, the combination of the two treatments (massage plus acupressure) was the most effective for reducing pain. Pain reduction was reported for all stages of labor including the latent, active and transition phases. However, completion time did not differ across groups. This was an unexpected finding given the data from an earlier study suggesting that labor massage not only reduced pain but also shortened the duration of labor [3].

Preterm Newborn Massage

Many recent publications on massage therapy effects have been focused on preterm newborns in the neonatal intensive care unit. The effects have included decreased pain during painful procedures, decreased respiratory distress, increased temperature, better feeding, greater weight gain, increased bone density, and greater brain maturation (see Table 2).



Table 2: Preterm newborn massage therapy effects (and first authors).

Effects	First authors
Decreased pain	Fitri, Liu
Decreased respiratory distress	Miralizadeh
Increased temperature	Nyaga
Increased food tolerance	Seiedi-Biarag
Increased weight gain	Alice, Lu
Increased bone mineral density	Elmoneim
Increased brain maturation	Lai

Massage therapy reduces pain during painful procedures

Procedural pain has been reduced in preterm neonates following massage therapy based on two meta-analyses in the recent literature. In one paper entitled “Massage therapy as a non-pharmacological analgesia for procedural pain in neonates”, 15 studies were reviewed that included a total of 1058 neonates in nine countries [4]. The decreased pain was common to all studies, but the research procedures differed in terms of the body part that was massaged, the duration of the massage, the intensity of the pressure and a combination of different treatments. In another meta-analysis with a similar title, 11 studies were reviewed (N=755 neonates). The Neonatal Infant Pain Scale and the Premature Infant Pain Profile were completed before and after painful procedures that did or did not include massage [5]. The duration of crying was shorter in the massage therapy infants, and blood oxygen saturation was greater, but respiration and heart rate were not affected. The latter findings are surprising given that respiration and heart rate are typically elevated by crying and they would be expected to be lower with less crying.

Respiratory distress decreases following massage

In a study on respiratory distress, one of the most common syndromes in preterm infants, infants received 10 minutes of foot or palm reflexology massage for six rounds (N=150 infants) [6]. Less respiratory distress followed palm than foot massage. That could be explained by the painful association of being touched on the feet with the frequent heelstick procedures on the feet.

Temperature increases during massage

In a study on massage effects on body temperature, preterm neonates (N=72) from Kenya received massage three times per day for 15 minutes each session [7]. Increased body temperature was noted on day six during and after the therapy sessions, and on day eight during the session as compared to before the session. Increased temperature would be expected even on the first day following the first massage based on earlier data [8].

Feeding intolerance decreases following massage

In a meta-analysis entitled “The effect of massage on feeding intolerance in preterm infants”, 528 papers were reviewed, but only six studies were included in the meta-analysis (N=128 preterm newborns) [9]. Improvements were noted including that the mean gastric residual volume decreased and the mean frequency of vomiting decreased. These findings may relate to increased vagal activity and increased gastric motility that have been noted in earlier studies, although these were not measured in this study [10]. The authors commented that the small number of studies and the small sample sizes, as well as the short interventions, limited the conclusions of this meta-analysis.

Weight gain increases following massage

The positive effects of massage therapy on feeding intolerance may have contributed to the weight gain effects in other studies. Unfortunately, those variables have not been studied together. Weight gain has been the primary measure in most of the preterm infant massage studies given that it is the criterion for infants being discharged from the neonatal intensive care unit. In a study entitled “Effect of tactile-kinesthetic stimulation on weight in preterm neonates in the neonatal intensive care unit” (N=40), the neonates were given the standard preterm massage [11]. This procedure involves 15 minutes of tactile/kinesthetic stimulation two sessions a day for 10 days [12]. In the current study, the massaged infants gained 11 grams per day versus the control infants who gained only 4 grams per day. In a meta-analysis on 15 studies (697 preemies), an average increase of 5 grams per day was reported [13]. The weight gain reported was greater for moderate versus

light pressure massage. This is not surprising given earlier research on the comparison between moderate and light pressure massage that suggested that moderate pressure was necessary for positive effects [14]. That research group had reported that the stimulation of pressure receptors under the skin increased vagal activity and gastric motility [10] as well as growth hormone [15]. The slowing of the nervous system as indexed by increased vagal activity has been widely accepted as the underlying mechanism for the effectiveness of the moderate pressure massage.

Bone mineral density increases following massage therapy

Increased bone mineral density following massage has also been reported in this recent literature. In a study entitled “Effect of tactile/kinesthetic massage therapy on growth and body composition in preterm infants”, the same massage procedure was used as in the earlier study, (referred to as the Field massage in this study) including three consecutive 15-minute sessions over a five-day period [16]. In this study on 60 preterm neonates, an increase in weight gain was reported at 13 grams per day, an increase in growth velocity at 9 grams per kilogram per day, an increase in total body mass, fat mass, lean mass and bone mineral density. This was one of the most comprehensive preterm massage studies in the literature, although its sample size seemed small for the number of measures taken.

Brain maturation increases following massage therapy

Brain maturation has also increased following preterm massage in one of the few published studies on mother-infant massage. In a randomized controlled trial, mothers gave massages to preterm infants who were born at 28 to 32 weeks gestational age [17]. Twenty-five preterm infants received massages from 34 to 40 weeks and were compared to 20 control infants. Greater central alpha relative power was noted in the massaged infants. And, massage therapy was correlated with beta, alpha and theta waves and negatively correlated with delta waves, which the authors suggested reflected greater brain maturation. The correlation of beta, alpha and theta waves with massage could also reflect more time in wakeful states and less time in deep sleep for the massaged infants.

Full-Term Newborn Massage Therapy

Positive effects of massage therapy have also been reported for full-term newborns. They include weight gain and pain reduction, as well as reduced jaundice, a condition that is prevalent in full-term newborns (see Table 3).

Table 3: Full-term newborn massage effects.

Effects	First Authors
Increased weight gain and decreased pain	Mrljak
Decreased hyperbilirubinemia (jaundice)	Amin, Kormaz, Dogan, Shahali

Weight Gain and Pain Reduction

In a review of 16 randomized controlled studies (N=1416 infants) that were published during the years 2017 to 2021, increased weight gain was shown in four studies and reduced pain in 5 of 7 studies [18]. Weight gain and pain reduction are less frequently targeted variables for full-term newborns as weight is usually normal and painful procedures are rarely performed. Jaundice (hyperbilirubinemia) is the most frequent problem for full-term newborns. And, reduced jaundice was noted in four studies in this review.

Hyperbilirubinemia is reduced by massage therapy

Hyperbilirubinemia (jaundice) is one of the most frequently treated conditions of full-term newborns. In a randomized controlled trial entitled “Effect of infant massage on the reduction in jaundice”, 100 newborns with hyperbilirubinemia were randomly assigned to a phototherapy group or a phototherapy combined with massage group [19]. As might be expected, the group that received massages in addition to their prescribed phototherapy showed a greater decrease in serum bilirubin levels and a greater increase in frequency of defecation. In another randomized controlled trial, massage therapy was given throughout the duration of phototherapy for 15 minutes twice per day (N=50 infants in Turkey) [20]. Once again, the massaged newborns showed a greater decrease in bilirubin and a greater frequency of defecation, but also an increase in urination and feeding. In still another randomized controlled trial, newborns with hyperbilirubinemia received three days of phototherapy two times per day (N=61) [21]. In those infants who received massage 10 minutes before the phototherapy, lower bilirubin levels



were noted by the third day and more frequent defecation on the second and third days. In a comparison between foot reflexology and body massage, bilirubin levels and physiological indicators were monitored in 51 newborns with jaundice [22]. Both intervention groups showed decreased bilirubin and increased oxygen saturation, but no differences were noted between intervention and control newborns on heart rate and respiration rate. The latter finding was surprising given that respiration and heart rate are typically slowed by massage. The similar findings for the foot reflexology and body massage groups is not surprising given that the infants in both groups were receiving stimulation of pressure receptors. The commonly reported reduction in bilirubin and increased defecation highlight the relationship between these effects of massage therapy. Both massage effects may relate to increased gastric motility that results in defecation and the disposal of bilirubin.

In a meta-analysis on 20 studies, a dose-response relationship was noted between the amount of massage and its effects on neonatal jaundice (Shahali et al, 2022). Surprisingly, the dose-response relationship suggested that the less than 50-minute massages were more effective than the greater than 100-minute massages. The authors suggested that their findings favored a causal relationship between massage therapy and reduced neonatal jaundice. The 10-minute massage prior to phototherapy may be the most effective intervention and certainly the most cost-effective [21]. Surprisingly, massage is not a commonly practiced protocol that could be cost-effectively given by parents of newborns with hyperbilirubinemia.

Pediatric Massage Therapy

The literature on pediatric massage from the last four years is very scarce. This is in contrast to as many as 80 studies that were included in a narrative review on pediatric massage therapy in 2019 [23]. This paucity of research may relate to the rarity of touch research in general during the social distancing of the COVID pandemic. Only four publications could be found in this recent literature on pediatric massage including one on burns, one on cancer and sickle cell disease and two on cerebral palsy. And these studies were conducted prior to the pandemic (see Table 4).

Table 4: Pediatric massage therapy effects.

Effects	First Authors
Decreased itching of burn scar	Valladares-Poveda
Decreased spasticity in cerebral palsy	Menmood, Topcu
Decreased symptoms in cancer and sickle cell	Rodgers-Melnick

In a paper entitled “A comparison of two scar massage protocols in pediatric burn survivors”, 100 children with burns were randomly assigned to two different scar massage protocols [24]. The effects of the two different protocols did not differ. In both groups, there was a reduction in itching and improved vascularity. These data are consistent with an earlier study on children who received massage prior to the painful debridement (skin brushing) procedure to reduce scar tissue [25]. In research on cerebral palsy, a study entitled “The effect of traditional massage on spasticity in children with cerebral palsy”, 86 children in Pakistan (mean age=7) received physical therapy and massage five times per week for 12 weeks [26]. Spasticity was decreased in the upper right limb by 6 weeks and by 12 weeks spasticity was reduced in the lower right limb. These results are inconsistent with earlier data showing a reduction of spasticity in all limbs of children with cerebral palsy following massage therapy [27]. The right limbs may have been more affected as they are typically the dominant limbs and therefore may have received more stimulation in general as well as from the physical therapy. And, of course the physical therapy and massage are confounded here without single condition control groups. In a review by a research group from Cyprus, 11 studies involving 297 children with cerebral palsy were included [28]. A decrease in muscle tone (spasticity) was noted in children with spastic cerebral palsy in all 11 studies. These data highlight the spasticity-reducing effects of massage therapy, although the data would be more compelling if these had been larger sample studies on similar measures that could be submitted to a meta-analysis.

In a study on pediatric massage with cancer and sickle cell patients, 3015 sessions were provided for 243 patients (approximately 12 sessions per patient) (mean age=12) [29]. All of the patients reported less pain, stress, and anxiety. The cancer group experienced greater pain reduction than the sickle cell disease group even though the children with sickle cell disease had higher baseline levels of pain, stress, and anxiety.

Adult Massage Therapy

Significantly more publications were found on massage therapy with adults than with children in this recent literature. They include studies on stress (cortisol, anxiety and sleep), on pain (arthritis, lower back pain, neuropathy and abdominal pain), on pre- and post-surgery and palliative care, and on diseases (cancer and multiple sclerosis) (see Table 5).

Table 5: Adult massage therapy effects.

Effects	First Authors
Decreased stress	
Decreased cortisol	Back
Decreased anxiety	Rapaport
Improved sleep	Golcbulut, Samuel
Decreased pain	
Increased pain pressure threshold	Wilson
Decreased liver transplant pain	Demur
Decreased neuropathy pain	Lopez
Decreased abdominal pain	Wang, Dehghan
Decreased rheumatoid arthritis pain	Lu, Subrael
Decreased knee osteoarthritis pain	Wu
Decreased back pain	Er, Chen
Decreased post-surgical pain	Alamen, Liu
Decreased pain in palliative care	Groninger
Decreased disease symptoms	
Decreased cancer symptoms	Samuel
Decreased multiple sclerosis symptoms	Heidari

Stress is reduced by massage therapy

In a randomized controlled study, 80 adults (age 50–75) were randomly assigned to a chair massage or a control group [30]. Serum cortisol levels were reduced by the massage, suggesting decreased stress. Given that cortisol is considered a more objective measure of stress and given the low expense of saliva assays of cortisol, it is surprising that this was the only research group that assayed cortisol. In a study on massage in adults with generalized anxiety disorder, the participants received massage two times per week and completed the Hamilton Anxiety Rating Scale at six and twelve weeks [31]. Surprisingly, once again, the shorter period (six weeks) was more effective. Compliance may lessen with the duration of studies due to the inconvenience of travel to the massage therapy sessions and the data from the less compliant participants could account for the lesser effects over time. In a randomized controlled trial focused on anxiety and sleep, post-menopausal women received foot massage [32]. The results suggested that the massage group experienced more sleep (mean=eight versus seven hours), lower scores on the Beck Anxiety Inventory (mean=26 versus 36), and lower scores on the Fatigue Severity Scale (mean=5.5 versus 23). Anxiety, fatigue and sleep are clearly related variables, but without a regression or structural equation modeling, it is difficult to know the relative significance of these variables.

In a review on randomized controlled trials of massage and relaxation therapy for cancer survivors, four massage trials were compared to three relaxation therapy trials [33]. Massage therapy improved self-reported sleep and accelerometer recordings suggested longer sleep episodes. These effects were not noted for the relaxation therapy trials. Relaxation therapy has often been used as a control group which has been criticized as it is not an active control group and requires more compliance and effort of the participants. A more balanced comparison might be between a self-massage and a relaxation therapy group. The massage effects might still be better due to the stimulation of the pressure receptors lowering the stress hormone (cortisol) levels.



Pain is reduced by massage therapy

Most of the adult massage therapy studies have involved research on pain. These include pain from several different conditions including pain following liver transplant, chemotherapy-related neuropathy pain, abdominal pain, back pain, and knee arthritis pain. In a paper entitled "Expectations affect pain sensitivity changes during massage", a randomized controlled trial was conducted (N=56) on receiving positive or negative expectation instructions followed by a pain-inducing or pain-free massage [34]. The pressure pain threshold was greater at three and four minutes for positive expectation participants receiving pain-inducing massage. It is not surprising that the pain tolerance would be higher after receiving positive expectation instructions resulting in attitudes like "grin and bear it", but it is surprising that an institutional review board would approve a pain induction massage because of the potential risks for the participants. In a randomized controlled trial on patients following liver transplant (N=80), hand massage resulted in decreased pain and anxiety [35]. It is not clear why hand massage was used when the hand is so distal from the liver. However, other distal massages like foot massage have even affected fetuses [36].

In another randomized controlled study, patients with chemotherapy-induced peripheral neuropathy pain (N= 71) received massage for three times per week for four weeks versus two times per week for six weeks [37]. Again, the shorter period of massage (four weeks) was more effective. The symptoms of chemotherapy-induced peripheral neuropathy pain were decreased for the affected area receiving Swedish massage for the shorter period of time (four weeks versus six weeks). The shorter period of massage was also more intense or greater dose (3 times per week versus 2 times per week) suggesting that frequency and duration are confounded in this study. That pain was reduced in the affected area is also noteworthy. More research is needed both on the dose of massage and comparisons between massage in affected and distal areas of the body.

Abdominal massage has been used for feeding intolerance in patients receiving enteral nutrition (drinking nutritional beverages and tube-feeding) in several studies and the data were entered into a meta-analysis [38]. In this meta-analysis, 11 massage therapy studies were included. The findings suggested a decrease in gastric residual volume, abdominal circumference, gastric retention, vomiting, abdominal distention, diarrhea, and constipation, highlighting the different gastrointestinal effects of massage. Another abdominal massage review was conducted to determine its effects on gastrointestinal function in patients [39]. This review included 10 studies on 464 patients with multiple sclerosis, cancer and older adults. The massage alleviated constipation, and it increased bowel movements in people in traction. As has been noted, these consistent results may derive from the increase in gastric motility that results from the stimulation of the gastric branch of the vagus nerve by massage therapy [40]. Most of the pain studies have targeted arthritis which is among the most common pain syndromes. In a randomized controlled study from Taiwan, patients with rheumatoid arthritis engaged in self-aromatherapy massage (N=102) [41]. Not surprisingly, the massage not only reduced pain but also enhanced sleep quality.

In another randomized controlled study, Swedish massage was conducted for 30 minutes two times a week for the first four weeks and three times a week for the second four weeks on 60 patients with rheumatoid arthritis (Sabrael et al. 2021). Pain and pain killer consumption decreased immediately after the first week of massages. The decrease in both pain and painkiller consumption continued even one month after the last session. Typically, the effects of massage are not sustained after the massage is discontinued, so this result was surprising. It is possible that the patients continued to receive massage or applied self-massage during the month after the end of the study, which could explain the continuing decrease in pain and pain killer consumption. In a review of 12 studies on pain (N=737 participants), massage was provided for adults with knee osteoarthritis [42]. After 1 to 4 weeks of therapy, decreased pain and stiffness were noted. After 6 to 8 weeks of therapy, a further decrease in pain was reported and functionality improved. Aromatherapy massage was not superior to massage alone, which was not surprising given that massage effects typically derive from the stimulation of pressure receptors not aroma receptors. Once again, positive effects were noted after short term therapy. As in several of these reviews, the results are limited by the small sample sizes and variability in the methodology of the different studies.

Back pain has been the focus of at least two randomized controlled studies. In one study, classical massage and connective tissue massage were compared for their effects on mechanical low back pain [43]. Classical massage led to greater pain relief at the end of the second week. But both types of massage involved the stimulation of pressure receptors, so it is not surprising that they both increased body temperature and they were equivalent on their positive effects on sleep and autonomic responses. The pain relief effects may have related to the increased serotonin (pain-relieving transmitter) levels

that are typically noted after massage therapy [36]. In the other randomized controlled study "High force versus low force" massage (moderate versus low pressure massage) were compared for their effects on low back pain (N=56 females) [44]. The participants received six 30-minute sessions with 10 minutes being focused on the lower back. The high versus low force massage alleviated pain as reported on visual analogue scales. The greater effects of moderate pressure (high force) massage would be expected, as already mentioned. However, there were no follow-up effects as would also be expected as the massage (stimulation of pressure receptors) was discontinued.

One randomized controlled study, and one meta-analysis appeared in this recent literature on massage therapy for post-surgical pain. In the randomized controlled trial, a massage therapy group was compared to a placebo control group following cardiac surgery (N=31) [45]. The massage group received 10-minute foot massages twice within 30 minutes after receiving an opioid medication. The massage group experienced less pain and less anxiety. This effect would be expected given that the control group was a "placebo" control. Massage therapy needs to be compared to more active control groups. Nonetheless, the enhancement of opioid effects by massage has rarely been reported and would clearly have clinical relevance. In the meta-analysis on massage therapy effects on pain following surgery, 33 randomized controlled trials were included [46]. Massage therapy resulted in reduced pain in both the short and the long-term (4 to 6 weeks after massage therapy). The effects were greater for adults and greater for C-section and heart surgery than for orthopedic surgery patients, possibly because casting following orthopedic surgery would obviate massage on the affected area. Surprisingly, no effects were noted for the length of session nor the dose nor the different types of massage therapy.

Dose levels were also assessed in hospitalized patients receiving palliative care [47]. In this randomized controlled trial on 387 patients, the most effective dose was three consecutive daily massages of 10 or 20 minutes. These data highlight the cost-effectiveness of the brief massages. And the helplessness feelings of family members may be alleviated by their performing the massages as massage has been noted to help both the massager and the "massagee" [48].

Disease Symptoms are reduced by massage therapy

Surprisingly, only two publications on massage therapy with diseases could be found in this recent literature. They include research on massage effects on cancer and multiple sclerosis. In a review paper on cancer (already described), massage therapy improved self-reported sleep, and long sleep episodes were recorded by accelerometer in four randomized controlled studies [33]. In a review paper on massage therapy as a complementary and alternative therapy approach for people with multiple sclerosis, 12 studies were included [49]. The authors concluded that pain and fatigue were reduced by Swedish massage, and depression and anxiety were reduced by reflexology. These differential effects of the different style massages are difficult to interpret. It may be that the Swedish massage which typically involves the entire body had more physiological effects while the reflexology which is more limited to pressure points may have led to greater expectations by the participants and the resultant psychological effects.

Neurological Symptoms in Older Adults are Reduced Following Massage Therapy

At least five publications on three neurological diseases in older adults appeared in this literature. They include stroke, Parkinson's, and Alzheimer's (see Table 6).

Table 6: Massage therapy effects on neurological symptoms in older adults.

Effects	First Authors
Decreased symptoms in older adults post-stroke	Cabanas-Valdes, Yunhui
Decreased Parkinson's symptoms	Kang, Angelopoulos
Increased attention in older adults with Alzheimer's	Kim

The publications on stroke survivors include two meta-analyses. In one meta-analysis, 18 randomized controlled trials were included (1989 individuals) [50]. The authors reported that Chinese massage (Tuina) plus conventional physiotherapy led to reduced spasticity and improved motor function. It is possible that conventional physiotherapy was reducing spasticity and improving motor function given that Tuina is a light pressure massage that would not be expected to have those effects. In the second meta-analysis that included 19 randomized controlled trials on massage for motor function after a stroke



(1556 patients), muscle spasms were reduced and increased balance stability was reported [51]. Surprisingly, greater motor function was noted following less than four weeks of therapy, but not more than eight weeks, especially in the lower limbs. It is not clear how massage increases balance stability, although increased vagal activity and the resulting attentiveness might have contributed to better performance on the balance measure.

Massage has also been effective for improving motor symptoms in Parkinson’s disease in at least two reviews in this literature. In the first of these on eight randomized controlled trials, there was a reduction of motor symptoms (363 patients with Parkinson’s) [52]. In another review, 12 studies were included [53]. Massage therapy generally increased relaxation, reduced non- motor symptoms, as well as sleep disturbances, pain, fatigue, anxiety, and depression. Traditional Japanese massage (Anma which is a rigorous massage that has been the basis for shiatsu), Thai massage, neuromuscular therapy and classical massage improved motor symptoms. Tuina combined with acupuncture worsened the symptoms. Tuina (a light pressure massage) might be expected to increase arousal which, in turn, would increase motor symptoms. The same could apply to acupuncture if the needle depth was too shallow. Only one study on massage for older adults with Alzheimer’s could be found in this literature. In this randomized controlled trial entitled “Effects of electrical automatic massage effects on cognition and sleep quality in Alzheimer’s disease spectrum patients”, chair massage led to increased attentiveness and improved sleep quality [54]. These findings are consistent with enhanced math performance following chair massage in an earlier study [55].

Other Forms of Massage Therapy

Self-massage therapy

Self-massage has also been effective. In a study entitled “Acute mechanism of the self-massage-induced effects of using a foam roller”, a comparison was made between a non-intervention on the leg and a foam roller leg massage (N=14) [56]. The foam roller massage resulted in increased temperature and increased range of motion. This study is not only based on too small a sample but also is lacking an active control group. In a study entitled “The acute effect of two massage techniques on functional capability and balance in recreationally trained older adult women”, manual massage was compared to stick massage (N=28) [57]. Both types of massage improved functional capability and balance. These findings are further support for the stimulation of pressure receptors under the skin leading to positive effects as both manual and stick massage would stimulate pressure receptors. Again, balance may have been improved by enhanced relaxation and/ or attentiveness following increased vagal activity and slowing of the nervous system.

Partner-administered Massage Therapy

Partners have also effectively administered massage. These include a father-infant massage study and a partners’ massage study (see Table 7).

Table 7: Effects of different forms of therapy.

Effects	First authors
Self-massage	
Foam roller massage	Yoshimura
Stick versus manual massage	Abrantes
Partner-Administered	
Father-infant massage improves interactions	Suchey
Couples’ massage helps both partners	Naruse

In a study entitled “Teaching father–infant massage during postpartum hospitalization”, a randomized controlled trial was conducted with father–infant pairs (N=98) [58]. An instruction massage video was given either before fathers were observed interacting with their infants or after their interactions. Giving the video to the fathers before their interactions resulted in better interactions with more touching. These results are consistent with an earlier study showing that fathers have better interactions in general following their massaging their infants [59]. In a study entitled “To give is better than to receive? Couples’ massage significantly benefits both partners’ well-being”, 19 couples were taught to massage each other [60]. No differences were noted between the effects of giving and receiving the massages. In an earlier study the benefits of giving

massages were even greater than receiving massages [48]. It is not surprising that the massager might benefit as much as the “massaged” as the person providing the massage would be stimulating pressure receptors in their arms and hands.

Potential Underlying Biological Mechanisms

Surprisingly, only one study referred to potential underlying mechanisms. In that study entitled “Massage as a mechanotherapy for skeletal muscle”, the authors referred to massage as attenuating the inflammatory response by decreasing TNF-alpha and IL-6 (both pro-inflammatory cytokines) [61]. The researchers also suggested that massage modulated skeletal muscle cell proliferation, ribosome turnover, and protein turnover. The most frequently proposed potential underlying mechanism for massage therapy effects is that moving the skin stimulates pressure receptors which leads to increased vagal activity (Field 2014). This effectively slows the nervous system as in, for example, decreased heart rate and decreased cortisol. Increased serotonin also results from enhanced vagal activity. Serotonin, as the body’s natural antipain neurotransmitter, in turn, knocks down substance P that causes pain, as has been documented for fibromyalgia pain [62]. This research group has reported that many of their studies have shown decreased cortisol as well as increased serotonin and increased dopamine (which is also depleted in fibromyalgia) (Field et al. 2002). Increased serotonin has also been noted in a critical review of 11 studies (Papathanassoglou & Mpouzika, 2012). The effects on cortisol varied according to the amount of pressure. Moderate pressure elicited a parasympathetic response (increased vagal activity and a slowing of the nervous system) in contrast to light touch that elicited a sympathetic response (arousing the nervous system).

Methodological Limitations of this Literature

The current literature on massage therapy effects has moved forward from that reviewed in 2019 by featuring many randomized controlled trials and meta-analyses [63]. However, it still has several of the same methodological limitations. The studies are still focused on clinical samples, likely because they are convenience samples that can be readily recruited from hospitals and medical centers. As such, the findings have often been confounded when the massage has been an add-on therapy. For example, massage therapy has frequently been added to physical therapy. Without assessing separate control groups, the results have been confounded. In addition, this has amounted to massage therapy research being focused exclusively on intervention rather than prevention studies. Another problem with recruitment has related to social distancing during the COVID pandemic. As a result, most of the studies published between 2020 and 2023 are studies that were conducted before 2020, and very little research has been conducted since then as suggested by the many protocols that have been published during this time period. To address these problems, massage therapists might be invited to collaborate with university faculty in order for research to be conducted on massage therapy for non-clinical samples. Massage therapists have potentially rich databases with their clients serving as participants in research. This would also make massage therapy research more feasible given that funding agencies consider massage therapy a traditional therapy that no longer requires research, thus limiting available funding.

Many of the randomized controlled studies unfortunately involve placebo or inactive control groups rather than active control groups. For example, massage therapy has been compared to relaxation therapy that requires more compliance and effort on the part of the participants, making the comparison imbalanced. And the results then merely confirm earlier studies. Although many different types of massage have been included in the meta-analysis studies, the individual style massages are rarely compared. When the data are grouped for meta-analyses, it appears that those therapies involving moderate pressure are effective while those featuring light pressure are not. Although significant advances have been made in measurement technology, the researchers have continued to use self-report scales or visual analogue measures. And even inexpensive measures like saliva cortisol assays have rarely been used. Of course, massage therapy research can never be double-blind research because participants receiving massage expect or know that massage is going to be effective. This has biased them to give positive ratings, the bias referred to as “faking good” or “social desirability”. The study on expectations highlights this problem [34]. Surprisingly, although immune measures were included in studies many years ago, as for example, natural killer cell assays in breast cancer and HIV, immune measures have not been included in recent studies [64]. The immune studies informed research on potential underlying mechanism research and mechanism research is also missing from the recent literature. Nonetheless, more rigorous randomized controlled trials and meta-analyses in this literature have supported earlier research, highlighting the positive effects of massage therapy [65-68].



References

- Hall HG, Cant R, Munk N, Carr B, Tremayne A, et al. (2020) The effectiveness of massage for reducing pregnant women's anxiety and depression; systematic review and meta-analysis. *Midwifery* 90: 102818.
- Field T (2017) Prenatal depression risk factors, developmental effects and interventions: A review. *Journal of Pregnancy and Child Health* 4(1): 301.
- Field T, Hernandez-Reif M, Taylor S, Quintino O, Burman I (2007) Labor pain is reduced by massage therapy. *Journal of Psychosomatic Obstetrics and Gynecology* 18(4): 286-291.
- Fitri SYR, Nasution SK, Nurhidayah I, Maryam NNA (2021) Massage therapy as a non-pharmacological analgesia for procedural pain in neonates: A scoping review. *Complement Ther Med* 59: 102735.
- Liu C, Chen X, Wu S (2022) The effect of massage therapy on pain after surgery: A comprehensive meta-analysis. *Complement Ther Med* 71: 102892.
- Miralizadeh A, Peyman A, Soltani NJ, Ashktorab T (2022) Comparison of the effect of foot and palm reflexology massage on respiratory distress syndrome in premature infants under noninvasive ventilation. *Complement Med Res* 29(2): 100-108.
- Nyaga E, Esamai F, Kyololo O (2021) Effect of massage therapy on preterm neonate's body temperature. *Afr Health Sci* 21(3): 1334-1339.
- Diego M, Field T, Hernandez-Reif M (2008) Temperature increases during preterm infant massage therapy. *Infant Behavior and Development* 31(1): 149-152.
- Seiiedi-Biarag L, Mirghafourvand M (2020) The effect of massage on feeding intolerance in preterm infants: a systematic review and meta-analysis study. *Ital J Pediatr* 46(1): 52.
- Diego M, Field T, Hernandez-Reif M (2005) Vagal activity, gastric motility, and weight gain in massaged preterm neonates. *The Journal of Pediatrics* 147(1): 50-55.
- Alice JJ, Senthil KS, Sosale S (2020) Effect of tactile-kinesthetic stimulation on weight in preterm neonates in Neonatal Intensive Care Unit. *Indian Pediatr* 57(11): 1071-1072.
- Field T, Schanberg SM, Scafidi F, Bauer CR, Vega-Lahr N, et al. (1986) Tactile/kinesthetic stimulation effects on preterm neonates. *Pediatrics* 77(5): 654-658.
- Lu LC, Lan SH, Hsieh YP, Lin LY, Chen JC, et al. (2020) Massage therapy for weight gain in preterm neonates: A systematic review and meta-analysis of randomized controlled trials. *Complement Ther Clin Pract* 39: 101168.
- Field T, Diego M, Hernandez-Reif M, Deeds O, Figueiredo B, et al. (2006) Moderate versus Light pressure massage therapy leads to greater weight gain in preterm infants. *Infant Behavior and Development*. 29(4): 574-578.
- Field T, Diego M, Hernandez-Reif M, Dieter J, Kumar A, et al. (2008) Insulin and Insulin-Like Growth Factor I (IGF-1) increase in preterm infants following massage therapy. *Journal of Developmental and Behavioral Pediatrics* 29(6): 463-466.
- Elmoneim MA, Mohamed HA, Awad A, El-Hawary A, Salem N, et al. (2021) Effect of tactile/kinesthetic massage therapy on growth and body composition of preterm infants. *Eur J Pediatr* 180(1): 207-215.
- Lai M, D'Acunto G, Guzzetta A, Finnigan S, Ngenda N, et al. (2022) Infant massage and brain maturation measured using EEG: A randomised controlled trial. *Early Hum Dev* 172: 105632.
- Mrljak R, Danielsson AA, Hedov G, Garmy P (2022) Effects of infant massage: A systematic review. *Int J Environ Res Public Health* 19(11): 6378.
- Amin T, Nur AN (2020) Effect of infant massage in reduction of neonatal jaundice. *Mymensingh Med J* 29(4): 901-905.
- Korkmaz G, Esenay FI (2020) Effects of massage therapy on indirect hyperbilirubinemia in newborns who receive phototherapy. *J Obstet Gynecol Neonatal Nurs* 49(1): 91-100.
- Doğan E, Kaya HD, Günaydin S (2023) The effect of massage on the bilirubin level in term infants receiving phototherapy. *Explore (NY)* 19(2): 209-213.
- Jazayeri Z, Sajadi M, Dalvand H, Zolfaghari M (2021) Comparison of the effect of foot reflexology and body massage on physiological indicators and bilirubin levels in neonates under phototherapy. *Complement Ther Med* 59: 102684.
- Field T (2019) Pediatric massage therapy research: A narrative review. *Children* 6(6): 78.
- Valladares-Poveda S, Avendaño-Leal O, Castillo-Hidalgo H, Murillo E, Palma C, et al. (2020) A comparison of two scar massage protocols in pediatric burn survivors. *Burns* 46(8): 1867-1874.
- Field T, Hernandez-Reif M, Quintino O, Schanberg S, Kuhn C (1998) Elder retired volunteers benefit from giving massage therapy to infants. *Journal of Applied Gerontology* 17(2): 229-239.
- Mahmood Q, Habibullah S, Babur MN (2020) The effects of traditional massage on spasticity of children with cerebral palsy: A randomized controlled trial. *J Pain Med Assoc* 70(5): 809-814.
- Hernandez-Reif M, Field T, Largie S, Diego M, Manigat N, et al. (2005) Cerebral palsy symptoms in children decreased following massage therapy. *Early Child Development and Care* 175(5): 445-456.
- Güçhan Topcu Z, Tomaç H (2020) The effectiveness of massage for children with cerebral palsy: A systematic review. *Adv Mind Body Med* 34(2): 4-13.
- Rodgers-Melnick SN, Bartolovich M, Desai NJ, Vasanna SH, Rivard RL, et al. (2023) Massage therapy for children, adolescents, and young adults: Clinical delivery and effectiveness in hematology and oncology. *Pediatr Blood Cancer* 70(4): e30243.
- Baek JY, Lee E, Gil B, Jung HW, Jang IY (2022) Clinical effects of using a massage chair on stress measures in adults: A pilot randomized controlled trial. *Complement Ther Med* 66: 102825.
- Rapaport MH, Schettler PJ, Larson ER, Dunlop BW, Rakofsky JJ, et al. (2021) Six versus twelve weeks of Swedish massage therapy for generalized anxiety disorder: Preliminary findings. *Complement Ther Med* 56: 102593.
- Gökbulut N, Ibici Akça E, Karakayali Ay Ç (2022) The impact of foot massage given to postmenopausal women on anxiety, fatigue, and sleep: A randomized-controlled trial. *Menopause* 29(11): 1254-1262.
- Samuel SR, Gururaj R, Kumar KV, Vira P, Saxena PUP, et al. (2021) Randomized control trial evidence for the benefits of massage and relaxation therapy on sleep in cancer survivors-a systematic review. *J Cancer Surviv* 15(5): 799-810.
- Wilson AT, Bishop MD, Beneciuk JM, Tilley HE, Riley JL 3rd, et al. (2023) Expectations affect pain sensitivity changes during massage. *J Man Manip Ther* 31(2): 84-92.
- Demir B, Saritas S (2020) Effect of hand massage on pain and anxiety in patients after liver transplantation: A randomised controlled trial. *Complement Ther Clin Pract* 39: 101152.
- Diego MA, Dieter JN, Field T, Lecanuet JP, Hernandez-Reif M, et al. (2002) Fetal activity following stimulation of the mother's abdomen, feet, and hands. *Dev Psychobiol* 41(4): 396-406.
- Lopez G, Eng C, Overman M, Ramirez D, Liu W, et al. (2022) A randomized pilot study of oncology massage to treat chemotherapy-induced peripheral neuropathy. *Sci Rep* 13(1): 8318.
- Wang J, Chen Y, Xue H, Chen Z, Wang Q, et al. (2023) Effect of abdominal massage on feeding intolerance in patients receiving enteral nutrition: A systematic review and meta-analysis. *Nurs Open* 10(5): 2720-2733.
- Dehghan M, Malakoutikhah A, Heidari FG, Zakeri MA (2020) The effect of abdominal massage on gastrointestinal functions: A systematic review. *Complement Ther Med* 54: 102553.
- Field T, Hernandez-Reif M, Diego M, Schanberg S, Kuhn C (2005) Cortisol decreases and serotonin and dopamine increase following massage therapy. *International Journal of Neuroscience* 115(10): 1397-1413.
- Lu PY, Wu HY, Chen LH, Liu CY, Chiou AF (2023) The effects of self-aromatherapy massage on pain and sleep quality in patients with rheumatoid arthritis: A randomized controlled trial. *Pain Manag Nurs* 24(4): e52-e60.
- Wu Q, Zhao J, Guo W (2022) Efficacy of massage therapy in improving outcomes in knee osteoarthritis: A systematic review and meta-analysis. *Complement Ther Clin Pract* 46: 101522.
- Er G, Yüksel İ (2023) A comparison of the effects of connective tissue massage and classical massage on chronic mechanical low back pain. *Medicine (Baltimore)* 102(15): e33516.
- Chen PC, Wei L, Huang CY, Chang FH, Lin YN (2022) The effect of massage force on relieving nonspecific low back pain: A randomized controlled trial. *Int J Environ Res Public Health* 19(20): 13191.
- Alameri R, Dean G, Castner J, Volpe E, Elghoneimy Y, et al. (2020) Efficacy of precise foot massage therapy on pain and anxiety following cardiac surgery: Pilot study. *Pain Manag Nurs* 21(4): 314-322.
- Liu J, Fang S, Wang Y, Gao L, Xin T, et al. (2022) The effectiveness of massage interventions on procedural pain in neonates: A systematic review and meta-analysis. *Medicine (Baltimore)* 101(41): e30939.
- Groninger H, Nemat D, Cates C, Jordan K, Kelemen A, et al. (2023) Massage therapy for hospitalized patients receiving palliative care: A randomized clinical trial. *J Pain Symptom Manage* 65(5): 428-441.



48. Field T, Peck M, Krugman S, Tuchel T, Schanberg S, et al. (1998) Burn injuries benefit from massage therapy. *Journal of Burn Care and Rehabilitation* 19(3): 241-244.
49. Heidari Z, Shahrbanian S, Chiu C (2022) Massage therapy as a complementary and alternative approach for people with multiple sclerosis: A systematic review. *Disabil Rehabil* 44(20): 5758-5769.
50. Cabanas-Valdés R, Calvo-Sanz J, Serra-Llobet P, Alcoba-Kait J, González-Rueda V, et al. (2021) The effectiveness of massage therapy for improving sequelae in post-stroke survivors. A Systematic review and meta-analysis. *Int J Environ Res Public Health* 18(9): 4424.
51. Yunhui X, Hao GU, Qing Z, Edie LI, Ying G, et al. (2022) Efficacy of meridian massage for motor function after a stroke: a systematic review and Meta-analysis. *J Tradit Chin Med* 42(3): 321-331.
52. Kang Z, Xing H, Lin Q, Meng F, Gong L (2022) Effectiveness of therapeutic massage for improving motor symptoms in Parkinson's disease: A systematic review and meta-analysis. *Front Neurol* 13: 915232.
53. Angelopoulou E, Anagnostouli M, Chrousos GP, Bougea A (2020) Massage therapy as a complementary treatment for Parkinson's disease: A systematic literature review. *Complement Ther Med* 49: 102340.
54. Kim YJ, Kim HR, Jung YH, Park YH, Seo SW (2021) Effects of electrical automatic massage on cognition and sleep quality in Alzheimer's disease spectrum patients: A randomized controlled trial. *Yonsei Med J* 62(8): 717-725.
55. Field T, Ironson G, Scafidi F, Nawrocki T, Goncalves A, et al. (1996) Massage therapy reduces anxiety and enhances EEG pattern of alertness and math computations. *International Journal of Neuroscience* 86(3-4): 197-205.
56. Yoshimura A, Sekine Y, Schleip R, Furusyo A, Yamazaki K, et al. (2021) The acute mechanism of the self-massage-induced effects of using a foam roller. *J Bodyw Mov Ther* 27: 103-112.
57. Abrantes R, Monteiro ER, Vale RGS, de Castro JBP, Bodell N, et al. (2021) The acute effect of two massage techniques on functional capability and balance in recreationally trained older adult women: A cross-over study. *J Bodyw Mov Ther* 28: 458-462.
58. Suchy C, Morgan G, Duncan S, Villar S, Fox F, et al. (2020) Teaching father-infant massage during postpartum hospitalization: A randomized crossover trial. *MCN Am J Matern Child Nurs* 45(3): 169-175.
59. Cullen C, Field T, Escalona A, Hartshorn K (2000) Father-Infant interactions are enhanced by massage therapy. *Early Child Development and Care* 164(1): 41-47.
60. Naruse SM, Cornelissen PL, Moss M (2020) 'To give is better than to receive?' Couples massage significantly benefits both partners' wellbeing. *J Health Psychol* 25(10-11): 1576-1586.
61. Van Pelt DW, Lawrence MM, Miller BF, Butterfield TA, Dupont-Versteegden EE (2021) Massage as a mechanotherapy for skeletal muscle. *Exerc Sport Sci Rev* 49(2): 107-114.
62. Sunshine W, Field TM, Quintino O, Fierro K, Kuhn C, et al. (1996) Fibromyalgia benefits from massage therapy and transcutaneous electrical stimulation. *Journal of Clinical Rheumatology* 2(1): 18-22.
63. Field T (2019) Social touch, CT touch and massage therapy. *Developmental Review* 51: 123-145.
64. Ironson G, Field TM, Scafidi F, Hashimoto M, Kumar M, et al. (1996) Massage therapy is associated with enhancement of the immune system's cytotoxic capacity. *International Journal of Neuroscience* 84(1-4): 205-217.
65. Diego M, Field T, Hernandez-Reif M, Deeds O, Ascencio A, et al. (2007) Preterm infant massage elicits consistent increases in vagal activity and gastric motility that are associated with greater weight gain. *Acta Paediatrica* 96(11): 1588-1591.
66. Gönenç IM, Terzioğlu F (2020) Effects of massage and acupressure on relieving labor pain, reducing labor time, and increasing delivery satisfaction. *J Nurs Res* 28(1): e68.
67. Sahraei F, Rahemi Z, Sadat Z, Zamani B, Ajorpaz NM, et al. (2022) The effect of Swedish massage on pain in rheumatoid arthritis patients: A randomized controlled trial. *Complement Ther Clin Pract* 46: 101524.
68. Shahbazi M, Khazaei S, Moslehi S, Shahbazi F (2022) Effect of massage therapy for the treatment of neonatal Jaundice: A systematic review and dose-response meta-analysis. *Int J Pediatr* 2022:9161074.