

ORIGINAL ARTICLE

# Understanding the impact of newborn touch upon mothers of hospitalized preterm neonates.

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## Abstract

**Introduction:** Many interventions have been designed to support the development of the preterm baby and minimise the complications of prematurity. However, there is limited evidence of the possible psychological benefits of touch to the mother when she is the one performing the support programme during the hospitalisation of her newborn.

**Objective:** This study explored whether the type of touch provided to preterm neonates had an impact on maternal self-efficacy, self-esteem and maternal-to-infant attachment, as well as newborn weight gain.

**Methods:** Using a randomised cluster trial, forty babies and their mothers were allocated to one of two groups receiving either a touch-based intervention (TAC-TIC; Touching And Caressing; Tender In Caring) or spontaneous touch.

**Results:** Mothers who provided the touch-based intervention demonstrated greater increases in self-efficacy, self-esteem and attachment, and babies gained more weight than those using spontaneous touch.

**Conclusion:** The results indicate that systematic touch interventions may be used to facilitate the mother-baby relationship as well as to promote newborn weight gain.

**Keywords:** Touch; Preterm; Newborn; Self-efficacy; Self-esteem; Attachment.

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## Authors summary

### Why was this study done?

There is limited evidence about the psychological outcomes for mothers when they are the ones who deliver touch-based interventions to their babies. This is particularly the case for mothers of premature and hospitalised newborns.

### What did the researchers do and find?

We allocated women to one of two groups who either used a touch-based intervention (TAC-TIC) or spontaneous touch (Control). Women implemented touch for 3 minutes (once per day) over 10 consecutive days. It was found that mothers who took part in the TAC-TIC intervention demonstrated greater gains in their self-efficacy, attachment and self-esteem than the spontaneous touch group across time.

### What do these findings mean?

The findings indicate that when women apply a touch-based intervention (such as TAC-TIC) it is likely to have positive psychological outcomes for them as well as the baby.

## INTRODUCTION

The birth of a premature baby has been described as a stressful event for parents and there is an abundance of literature available that ranges from parents' own accounts<sup>1,2</sup>, from clinical observations<sup>3</sup>, and from scientific research<sup>4,5</sup>. There have been many therapeutic interventions created to date which aim to support the growth, both physical and mental, of the preterm newborn<sup>6,7</sup> and minimise the complications of prematurity<sup>8</sup>. The kinds of intervention that have been used to date with preterms have predominantly been tactile in nature and have reported that some form of touch may play a vital role in facilitating the development of a preterm<sup>9,10</sup>.

Since the 1970s several types of touch interventions/support programmes have been developed, and these have included; skin-to-skin contact such as kangaroo care<sup>11</sup>, gentle systematic touch such as TAC-TIC (Touching And Caressing-Tender In Caring)<sup>12</sup>, and moderate pressure touch such as massage<sup>13</sup>. A review of interventions in place in 82 neonatal units in the United States of America<sup>14</sup> suggests that static touch or skin-to-skin contact is used the most (containment [86%] and kangaroo care [98%]) with active touch used less than half of the time (massage [38%]). The benefits of receiving early supplemental touch to babies are well documented in the literature and generally relate to growth and development<sup>15-17</sup> and include, increased oxygen levels<sup>18,6</sup>, enhanced behavioural organisation<sup>19</sup>, reduced hospital stay, reduced loss of weight during first week and weight gain<sup>12,14,20-23</sup>.

However, the majority of these interventions have almost exclusively reported effects upon the baby and not investigated the effects on the parents when they are the ones providing the touch. In the limited number of studies that have been conducted, the benefits are in relation to breastfeeding outcomes<sup>24</sup>, mothers emotional suffering and self-esteem<sup>25</sup>, maternal mood state<sup>26</sup>, mother-infant interaction<sup>27</sup>, and attachment<sup>28</sup>. However, these studies have almost exclusively recruited mothers when they are at home, 3-4 months following birth and/or with fullterm newborns. Yet there is a much more limited amount of work conducted that has investigated the possible psychological benefits to mothers of hospitalised preterms when they are the ones performing the intervention/support programme. Therefore, there is a real need to develop and evaluate touch intervention programmes that aim to support parents and their preterm newborns during this time. Also, intervention/

support programmes that target the psychosocial support of parents<sup>29</sup> may have a positive effect upon the child's environment, and fits within the theoretical framework of Neonatal Health Psychology<sup>30</sup>.

The factors that could contribute most to the mother's psychological wellness at this time may include; maternal self-efficacy, self-esteem and the quality of attachment<sup>31</sup>. Maternal self-efficacy has its roots within Social Cognitive Theory<sup>32</sup> and is a type of self-reflective thought that affects how a parent thinks, feels and acts<sup>32,33</sup>, and is a major determinant of human motivation<sup>34</sup>. Maternal self-efficacy is defined as being, "specific to a women's perceived performance in the maternal role, and the beliefs she has in her ability to respond contingently to the signals of her infant"<sup>35</sup>. Mothers who have a higher self-efficacy are likely to display more sensitive behaviour towards their baby<sup>36</sup>, will choose to take part in more challenging parenting activities and are more likely to persevere when confronting obstacles or adverse situations<sup>37</sup>. Indeed, Lappin<sup>38</sup> and Clausen, Aguilar, and Ludwig<sup>39</sup> have shown that mothers who use touch as an intervention/support programme with their 3-4-month-olds demonstrate increased self-efficacy. Indeed self-efficacy has also been shown to predict child weight outcomes<sup>40</sup>.

Maternal self-esteem on the other hand refers to the value a woman attaches to her reflected appraisal of herself as a mother<sup>36,41</sup>. Mothers with a higher self-esteem are more likely to maximise developmental outcomes in their infants and higher self-esteem also results in successful parenting behaviours<sup>42</sup>. Mothers who have a high self-esteem will develop more positive parenting styles<sup>43</sup> and benefit from lower levels of parenting stress<sup>44</sup>, anxiety and depression<sup>45</sup>. The emerging mother-infant relationship, particularly the mother's ability to interact and care for her preterm infant, is viewed as central to the mother's development of self-worth<sup>46,47</sup>. In fact, Cody<sup>48</sup> found higher self-esteem in mothers who had used touch as an intervention/support programme with their infants.

Maternal attachment is the unique, affectionate relationship that develops between a woman and her baby and which persists over time<sup>49</sup>. Research suggests that mothers who have increased levels of attachment to their child are much more likely to have children who go on to form secure lifelong relationships<sup>50</sup>, that these attachments remain stable across several generations<sup>51</sup>, and that their children will more likely adapt to varying social situations

with greater ease<sup>52</sup>. In a study by Feldman, *et al.*<sup>53</sup> they have shown that Kangaroo Care provided to premature infants resulted in increased maternal attachment behavior in the postpartum period from 6 months to 10 years of age.

The primary aim of this study was to explore whether the type of touch provided to hospitalized preterm neonates would impact maternal self-efficacy, self-esteem, and maternal-to-infant attachment.

## METHODS

### Study design

This study used a pre-test/Post-test repeated measures design. Independent variables included Touch-type (TAC-TIC [Experimental] or Spontaneous [Control] touch) and Timepoint (Pre-test/Post-test). Dependent variables included Maternal Self-efficacy, Self-esteem, and Attachment Scores).

### Participants

A sample of 40 mothers (age from 18-42) and their healthy preterm babies (*i.e.* those whose condition is relatively stable and who are not receiving oxygen therapy or mechanical ventilation) were recruited by convenience and allocated to one of two touch-type groups (A structured touch intervention/support programme – TAC-TIC [Touching And Caressing-Tender In Caring] or a group of mothers who provided a spontaneous touch intervention) using a cluster randomised trial. Mothers and their babies were recruited if the infant was born preterm (<2.5kg in birth weight and <37 weeks gestational age), was within their first 28 days of postnatal life, had no diagnosed

genetic anomalies, congenital malformations, and were not receiving oxygen therapy. Sample size was estimated based on a large effect size, with 80% power and at a 0.05 level of significance. There was no attrition from the study and each of the forty mothers who consented to take part was retained for the entire duration. The average time spent in the hospital was 37 (s.d. =3.74) for the control group and 32.7 (s.d.= 2.2) for the TAC-TIC group.

### Touch Intervention

In the intervention/support programme group mothers were taught and followed a specific protocol of systematic touch known as TAC-TIC (TAC-TIC - Touching And Caressing; Tender In Caring<sup>12</sup>). As can be seen in Table 1 this version of TAC-TIC was developed (Version-4) for use with relatively healthy preterms; it consists of 14 individual stroking movements that are repeated continuously 3 times during a 3-minute session and without undressing the baby. This version of TAC-TIC was designed to be carried out by the mother in comparison to other previous versions that were designed for babies on ventilation and carried out by a researcher. Mothers were taught how to use TAC-TIC and practised this on a doll first before touching their own baby. The information provided to mothers was only procedural and involved describing and demonstrating the way in which the baby should be touched. Once mothers understood what they needed to do they proceeded with the first session of the 10-day study period (1 session of 3 minutes per day) under supervision by the investigator who is a trained psychologist.

**Table 1:** Table showing the characteristics of TAC-TIC

Version	Number of movements	Number of administrations per day and (duration)	Population Group
1	22	1-3 (10 mins)	Relatively Healthy
2	22	2 (3-4 mins)	Ventilated
3	17-20	2 (3-4 mins)	Extremely Low Birthweight
4	14	1 (3 mins)	Relatively Healthy

### Spontaneous touch – support group)

Rather than making comparisons between babies who received TAC-TIC and those who received standard care and nothing more, it was believed that spontaneous touch would act as a truer comparison group. In the spontaneous touch group the mothers were asked to use spontaneous touch to interact with their baby and that this was to be done however they normally touched their baby. No further instruction was given on how they might go about this. However, mothers were asked; (1) not to handle (*e.g.* pick up or turn over), (2) perform any activities such as feeding or changing, or (3) stimulate any of the other senses of the baby (*e.g.* talking to the baby), which was requested of mothers in the intervention/support programme group too. Mothers in the Spontaneous touch group also carried this out for three minutes, once per day over 10 days. Both groups checked in with the investigator on a daily basis to ensure the session was conducted.

Note: the randomised cluster trial design implies

that there was a period of 'wash-out' between groups thus mothers did not meet with each other.

### Measures

Mothers in both groups were given the same pre/post-test questionnaires that measured three different psychological constructs (maternal self-efficacy, self-esteem and attachment) and also a short factual section (measuring factors such as babies' birthweight, gestation age, maternal age etc). Weight gain was recorded by nursing staff and noted by the lead author. The psychometric measures comprised the following.

The Perceived Maternal Parenting Self-Efficacy questionnaire (PMP S-E<sup>54</sup>) consists of 20 items and four subscales (Caretaking procedures [4], evoking changes in their baby's behaviour [7], reading their baby's behaviour or signalling [6], and situational issues [3]). All items are on a four-point Likert scale and range from 'strongly agree' to 'strongly disagree'. Thus, mothers can have a potential

self-efficacy score of between 20–80. The scale has been fully validated with a UK population which includes an internal reliability of 0.91, and a test-retest reliability value of 0.96.

The Maternal Self-Esteem Inventory (MSRI<sup>55</sup>) short form has 26 items measured on 5 individual subscales (Caretaking ability [6], General ability and preparedness for mothering role [8], Acceptance of baby [3], expected relationship with the baby [5], and Feelings concerning pregnancy, labour and delivery [4]). In this study the MSRI had a total pre-intervention item alpha of 0.84.

The Parent-to-infant attachment questionnaire (PIA<sup>56</sup>) is a 19 item scale with 3 subscales (Quality of attachment [9], Absence of hostility [5], and Pleasure in interaction [5]). In this study the questionnaire had a total pre-intervention item alpha of 0.69.

**Procedures**

Following University and hospital ethics approval of the project, and once mothers provided informed consent, the study lasted over a 10-day period. At the beginning

(day-1) and end (day-10) of the study mothers were asked to fill-in the same questionnaires. During the study period mothers were asked to touch their baby in line with the process documented above for either the spontaneous touch or TAC-TIC intervention/support programme group and this was supplemental to the standard care mothers/babies received. Also, the baby’s weight was monitored at the onset and closure of the study period. There was a period of ‘washout’ lasting 3 weeks between recruitment of TAC-TIC intervention/support programme and Spontaneous touch group mothers to avoid potential confounds.

**RESULTS**

A total of forty-seven mothers and their babies, who met the inclusion/exclusion criteria, were approached and in all 40 took part. The sample characteristics can be seen in table 1. Data screening indicated that the sample were normally distributed and there were no significant differences between any of the baseline measures and the intervention group that the mother/baby belonged to.

**Table 2:** Mean (s.d.) values for maternal/preterm characteristics by group.

	Touch type group (Mean (s.d.) or frequency)	
	Control - Spontaneous (n=20)	Intervention – TAC-TIC (n=20)
Maternal/Preterm Characteristics		
Babies’ Sex	M=11 / F= 9	M=8 / F= 12
Birth Weight (kg)	1.6 (0.34)	1.44 (0.28)
Weight Gain (kg)	0.23 (0.02)	0.36 (0.02)
Gestation Age (weeks)	32 (2.2)	31.4 (1.7)
Postnatal Age (days)	13 (3.9)	11.7 (4.2)
Maternal Age (years)	28 (6.3)	27.7 (5)
Pre/Post tests		
Self-Efficacy	60.6 (9.5) / 66.6 (8.5)	61.3 (9.5) / 72 (6.5)
Self-Esteem	76.1 (11) / 79.4 (8)	70.4 (9.4) / 95.1 (5.5)
Attachment	83 (6) / 85.7 (6.2)	79.8 (5.5) / 89.4 (3.7)

Relationships between Self-efficacy, Attachment, Self-esteem and demographic characteristics

Pearson’s correlations between Self-efficacy, Attachment, Self-esteem and demographic characteristics can be seen in table 2. A higher parenting self-efficacy

was significantly related to a greater maternal-to-infant attachment (p<0.01), and greater maternal self-esteem (p<0.05). Higher maternal self-esteem was significantly related to weight gain in the babies (p<0.05) as was self-efficacy (p<0.05).

**Table 3:** Relationships (Pearsons r) between self-efficacy, Attachment, Self-esteem and demographic characteristics

	1	2	3	4	5	6	7
1. Self-efficacy	---	.61**	0.38*	0.16	0.14	0.08	0.32*
2. Attachment	.61**	---	.31	0.05	-0.01	0.16	0.25
3. Self-esteem	.38*	.31	---	0.4**	-0.23	-0.1	0.40*
4. Birthweight	0.16	0.05	-0.4**	---	.63**	0.28	-0.25
5. Gestation Age	0.14	-0.01	-0.23	.63**	---	0.23	-0.15
6. Maternal Age	0.08	0.16	-0.10	0.28	0.23	---	-0.11
7. Weight Gain	0.32*	0.25	.40*	-0.25	-0.15	-0.11	---

\*p<0.05, \*\*p<0.01



Effects of touch type and pre-test/post-test measurement on maternal self-efficacy, attachment and self-esteem, and newborn weight gain

A two way repeated measures ANOVA was carried out on three separate dependent maternal variables; self-efficacy, attachment and self-esteem. There was a significant main effect of intervention (touch type) for self-esteem ( $F(1,38)=4.49$ ,  $p<0.05$ ,  $\eta^2=0.04$ ) where mothers in the TAC-TIC intervention scored higher than those in the spontaneous touch group. But no significant main effects were found for self-efficacy ( $F(1,38)=1.68$ ,  $p>0.05$ ,  $\eta^2=0.04$ ) or attachment ( $F(1,38)=0.024$ ,  $p>0.05$ ,  $\eta^2=0.001$ ). There was a significant main effect of time (pre/post-test) for self-efficacy ( $F(1,38)=40.88$ ,  $p<0.001$ ,  $\eta^2=0.19$ ), Attachment ( $F(1,38)=47.52$ ,  $p<0.001$ ,  $\eta^2=0.23$ ), and Self-esteem ( $F(1,38)=94.38$ ,  $p<0.001$ ,  $\eta^2=0.31$ ) where scores at post-test were significantly higher than pre-test. In addition, there were significant interaction effects between intervention (touch type) and time (pre/post-test) for attachment ( $F(1,38)=15.16$ ,  $p<0.001$ ,  $\eta^2=0.07$ ) and self-esteem ( $F(1,38)=55.19$ ,  $p<0.001$ ,  $\eta^2=0.18$ ), but not for self-efficacy ( $F(1,38)=3.24$ ,  $p>0.05$ ,  $\eta^2=0.02$ ). In general, the interactions seem to indicate that mothers who took part in the TAC-TIC intervention increased more in their self-efficacy, attachment and self-esteem than the spontaneous touch group from pre- to post-test – although there was a non-significant interaction with self-efficacy this was approaching significance ( $p=0.08$ , power = 0.42). In addition, although baseline measurements were not significantly different the TAC-TIC intervention mothers did have lower on average scores for Attachment and Self-esteem. However, there was a significant main effect of intervention on the amount of weight the baby gained ( $F(1,38)=18.18$ ,  $p<0.001$ ,  $\eta^2=0.12$ ). The mean weight gain over the study period was higher for the TAC-TIC intervention support programme.

## DISCUSSION

The primary aim of this study was to explore whether the type of touch provided (systematic or spontaneous) to hospitalised preterm neonates would, (i) have an impact upon maternal self-efficacy, self-esteem and maternal-to-infant attachment, and (ii) demonstrate changes in growth of the baby as indicated by weight gain. In this study both systematic and spontaneous touch produced increases in all maternal psychological variables over time. Although it is unclear why spontaneous touch demonstrates these effects it may be because the group of mothers in this study were also required to check-in daily with the investigator and different effects may have been observed if their only contact time was solely during the completion of the pre/post-test measures.

Despite this, it is clear that maternal variables showed significantly greater increases for mothers who provide systematic touch rather than spontaneous touch and this supports the use and importance of touch as a support programme within neonatal units, particularly during the neonatal period in hospital. Though self-efficacy was only approaching significance for the interaction, the results show that this finding was underpowered and that baseline measures - although not significantly different -

were lower for the intervention group. These results can be taken as evidence and support for the use of touch as a support programme within the context of the neonatal unit although some caution is needed when interpreting the results and their respective effect sizes. Based upon our findings, previous research and theory, it is likely that these mothers have stronger beliefs in their ability to deal with the full range of parenting tasks at this time<sup>32,33</sup>, will attempt more difficult parenting tasks, and show greater perseverance when confronting negative situations such as changes in infant health status<sup>37</sup>. Although further testing is necessary it is plausible that increases in maternal self-efficacy, self-esteem and attachment will equip mothers with all of the necessary skills and self-belief they need in order to provide sensitive behaviour towards their baby<sup>36</sup> and allow them to better adjust stimulation to their baby's social signals. It appears that the use of touch by mothers is a clinically important intervention to consider when offering psychological support.

Weight gain was also significantly different between the groups and babies who received the touch intervention gained more weight over the study period than controls. This finding is in line with previous research in the area<sup>12,14,20-23</sup>. Significant correlations were also found between the mothers' psychological variables, and between self-esteem and weight gain. The correlation between self-esteem and weight gain is interesting but the nature of this relationship remains unclear since it is not possible to conclude which factor results in the effect on the other. Related studies with mothers of 1 year olds indicate that maternal parenting self-efficacy predicts child weight outcomes<sup>40</sup> but limited to date has found such a relationship with maternal self-esteem. Whilst it is not possible to establish the direction of causality the results from this study simply indicate a difference between type of touch and weight gain, and type of touch and self-esteem.

A strength of this study was the use of a robust study design. Nevertheless it was not possible to ensure that mothers only applied the touch intervention whilst the investigator was present. This is an issue that is very difficult to control. However, mothers were asked to check-in with the investigator and were loosely monitored throughout the day. It would be valuable to investigate the duration of time needed to produce significant benefits; including the duration of time touch is performed within each session and the number of days the therapeutic intervention lasts for, since mothers only used the touch intervention for 3 minutes in this study. Currently, there is considerable variation in how tactile interventions are delivered ranging from days through to weeks. This may of course vary in accordance with the individual needs of each and every baby and the required threshold necessary to see any health and developmental benefit and a larger clinical trial is recommended.

## CONCLUSION

This study has shown that touch interventions play an important role not only for baby's but also for their mothers. Measurement of self-efficacy, self-esteem and attachment should be considered in order to help health professional's guide and support parents of preterms.

Touch interventions such as the one in this study are complimentary to existing ones which are already in use (e.g. kangaroo care) and recommended for use in maternity services<sup>57</sup>. The benefits of such interventions includes those to the baby but also extends to the parents thus facilitating/promoting early parenting. This is important because the touch intervention used in this study is easy for mothers to perform, does not involve removing the baby from their incubator or cot, does not involve handling or undressing

the baby, and empowers the parents to take a more active role in their own baby's growth and development. However, further longitudinal study is required in order to understand the future impact upon the newborn and parent.

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## Resumo

**Introdução:** muitas intervenções têm sido desenhadas para apoiar o desenvolvimento do bebê prematuro e minimizar as complicações da prematuridade. No entanto, são limitadas as evidências dos possíveis benefícios psicológicos do toque para a mãe quando é ela quem realiza o programa de apoio durante a hospitalização de seu recém-nascido.

**Objetivo:** este estudo explorou se o tipo de toque fornecido aos recém-nascidos prematuros teve impacto na autoeficácia materna, autoestima e apego materno-infantil, bem como no ganho de peso do recém-nascido.

**Método:** usando um estudo randomizado de cluster, quarenta bebês e suas mães foram alocados em um dos dois grupos que receberam uma intervenção baseada em toque (TAC-TIC; Tocando e acariciando; Tender In Caring) ou toque espontâneo.

**Resultados:** as mães que forneceram a intervenção baseada no toque demonstraram maiores aumentos na autoeficácia, autoestima e apego, e os bebês ganharam mais peso do que aqueles que usaram o toque espontâneo.

**Conclusão:** os resultados indicam que intervenções sistemáticas de toque podem ser utilizadas para facilitar a relação mãe-bebê, bem como para promover o ganho de peso do recém-nascido.

**Palavras-chave:** toque, pré-termo, recém-nascido, autoeficácia, autoestima, apego

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