



# Maternal kisses are not effective in alleviating minor childhood injuries (boo-boos): a randomized, controlled and blinded study

The Study of Maternal and Child Kissing (SMACK) Working Group

## Keyword

evidenced-based medicine

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## Abstract

**Background** The practice of maternal kissing of minor injuries of childhood (boo-boos), though widely endorsed and practised, has never been demonstrated to be of benefit to children.

**Objective** To determine the efficacy, if any, of maternal kissing of boo-boos in toddlers.

**Design** Randomized, controlled and double-blinded study of children with experimentally induced minor injuries. Control arms included both no intervention group and 'sham' (non-maternal) kissing. Children were blinded to the identity of the kisser in both the maternal and sham control groups.

**Setting** Outpatient research clinics in Ottawa, Canada.

**Participants** 943 maternal–toddler pairs recruited from the community.

**Measurements** Toddler Discomfort Index (TDI) pre-injury, 1 and 5 minutes post-injury.

**Results** One-minute and 5-minute TDI scores did not differ significantly between the maternal and sham kiss groups. Both of these groups had significantly higher TDI scores at 5 minutes compared to the no intervention group.

**Conclusions** Maternal kissing of boo-boos confers no benefit on children with minor traumatic injuries compared to both no intervention and sham kissing. In fact, children in the maternal kissing group were significantly more distressed at 5 minutes than were children in the no intervention group. The practice of maternal kissing of boo-boos is not supported by the evidence and we recommend a moratorium on the practice.

## Introduction

The use of maternal kisses in the treatment of minor injuries occurring in early childhood (boo-boos) predates the era of evidence-based medicine by at least several decades. As such, controlled studies of maternal kissing are rare and, in general, poorly designed. A recent Cochrane Collaboration systematic review of maternal kissing in childhood injuries discovered that most studies lacked sufficient scientific rigor [1]. The authors note that control groups were often lacking and, when present, randomization virtually never occurred. In no studies were children blinded to the identity of the kisser. The authors conclude that 'given the current paucity of data in support of effectiveness, the practice of mother's kissing the minor injuries of young children cannot be supported' [1].

Nonetheless, maternal kissing of infants and toddler boo-boos continues to be a common first line therapy. According to the US Census Bureau, fully 97% of American mothers admitted to kissing at least one minor childhood injury in 2010 [2]. Furthermore, a survey of the American Pediatric Association found that 83% of paediatricians either 'strongly agreed' or 'agreed' with the statement 'I encourage mothers to kiss the boo-boos (minor injuries) of

their infants and toddlers' [3]. Such widespread endorsement of an unproven intervention bespeaks the untoward propensity of doctors (at least American doctors) to accept tradition, magical thinking and expert opinion as a foundation for clinical practice [4].

In an effort to help understand the value, if any, of maternal kissing in the treatment of minor childhood injuries, we formed the Study of Maternal and Child Kissing (SMACK) Working Group in 2009. This multi-centred, multidisciplinary group of clinicians and researchers realized early on that only a randomized, controlled and blinded study would be able to definitively determine the efficacy of boo-boo kissing.

## Methods

### Subjects

Maternal–toddler pairs were solicited through advertisements in family medicine and paediatric clinics throughout the city of Ottawa, Canada. Inclusion criteria for children were age between 18 and 36 months and the ability to communicate pain or discomfort through tears or words. Mothers had to be over the age of 18, English- or French-speaking, and have two lips sufficient in nature

to deliver a palpable kiss. Mothers were excluded if they had oral ulcers or had ever been indicted or convicted of child abuse or neglect.

We screened 1368 maternal–pairs, enrolling 943 in the study. Informed consent was obtained from the mothers prior to enrolment and assent, in the form of a bit of a smile, was obtained from all toddlers. The study was approved by the Human Subjects Committee of the SMACK.

### Induction of boo-boos

In order to best simulate the types of injuries most often occurring in toddlers, two different methods of inducing boo-boos were employed, both of which have been described previously [5]. To induce head boo-boos, a piece of chocolate was placed under a low table edge and the child would be allowed to crawl to the candy. Invariably, the child would then stand to eat the chocolate and would strike his or her head on the table edge. All tables were constructed of soft wood (pine or fir) and edges were appropriately rounded enough to guarantee that skin would not be broken. Hand boo-boos were induced by placing a favourite object (lovey) of the child just out of reach on a counter behind a heated coil. Attempts to obtain the lovey would result in a noxious thermal stimulus to the fingertips. The coil was heated to 50 degrees Celsius (120 F) in order to produce a significant but non-damaging stimulus. Each child was subjected to only one boo-boo during per testing session. Sessions were separated by 1 week and were held in different study centres in order to avoid the confounder of child recall.

### Randomization and blinding

Prior to the induction of boo-boos, children were randomized to one of three potential interventions: (1) a maternal kiss of the injured body part, (2) a non-maternal (sham) kiss of the injured body part or (3) no intervention. Randomization took place after a child was secured in the testing facility, and neither investigators nor mother was aware of the study arm prior to this moment. Assignment to study arms was determined by a random number generator at a secure location and relayed to the test site by a satellite uplink. In the intervention groups, children were blinded to the identity of their kisser by having them place the injured body part into an appropriately sized aperture in an opaque screen. Maternal kisses were delivered in the fashion usual for the mother–child pair (if applicable) and without verbal embellishment that might have served to negate the blinding. ‘Sham’ kisses were delivered by a trained researcher, free of oral ulcers, with a standard 5-second pressing of both lips on the affected body part followed by an exaggerated puckering sound. A third investigator assessing the child response was also blinded to the intervention, not beginning the observation period until 30 seconds after the boo-boo induction and the kiss (in the intervention groups) had been delivered.

### Outcome measures

The effect of the intervention was assessed using the Toddler Discomfort Index (TDI), a 15-point, five-domain, non-verbal tool that allows for the quantification of distress in small children [6]. For instance, the domain of auditory expression of discomfort

**Table 1** Toddler Discomfort Scores at baseline, 1 minute and 5 minutes after induction of minor traumatic injury

Intervention	Pre-injury	1 minute post	5 minutes post
None	3.5	36.3	14.9
‘Sham’ kiss	3.3	38.9	24.8*
Maternal kiss	3.6	34.8	23.0*

Between group differences assessed by Fisher’s exact test. All differences are non-significant with  $P > 0.2$ , except for \*where  $P < 0.05$  for interventions compared with no intervention.

includes the decibel level of crying, the duration of crying and the length of time from the first expression of discomfort to the crescendo (breathholding coefficient). The TDI has been described in earlier reports and has been validated in both traumatic injuries and non-traumatic illnesses [7]. Scores range may range from 0 (no visible distress) to 45 (heart-rending distress). A difference of 5 points is considered clinically significant. All assessments were made by one of two investigators with extensive experience in administering the TDI.

### Results

In total, 943 maternal–child pairs participated in 1374 boo-boo inductions. Although the study design called for each maternal–child pair to participate in two boo-boo inductions each, 512 mothers did not complete the second study session. Reasons for not completing the second session included the development of oral ulcers in the mother (1), interim indictment on child neglect charges (1) and other reasons (510). There was a trend ( $P = 0.08$ , data not shown) for those mothers whose child received the sham-kiss intervention in the first testing session to not complete the second.

Of the 1374 boo-boo inductions, 446 subjects received maternal kisses, 443 received ‘sham’ kisses and 445 received no intervention. One-minute and 5-minute TDI scores did not differ significantly between the maternal and sham kiss groups. Both of these groups had significantly higher TDI scores at 5 minutes compared with the no intervention group (Table 1).

### Discussion

This randomized, controlled and blinded study demonstrated no value to maternal kisses compared to sham kisses in alleviating the distress of toddlers with boo-boos. In addition, 5 minute scores of distress were higher in toddlers who had their injured body part kissed (maternal and ‘sham’) compared with those who received no intervention. Although this finding suggests that maternal kissing may actually be worse than no intervention at all, we do suggest caution in endorsing this conclusion. (It did appear that requiring children to put their injured head or arm through a dark aperture may have induced some level of additional stress to some particularly sensitive children.)

Still, the lack of efficacy of maternal kisses compared with ‘sham’ kisses suggests that, despite being advocated by doctors and endorsed by virtually all mothers, there is no scientific justification to the practice. Some would likely argue that, given that

maternal kisses did not clearly harm children, the practice is innocuous. In addition to defying the very tenets of evidence-based medicine, this argument also fails to recognize potential untoward effects of maternal kissing of boo-boos. First, the placing of the lips on the soiled appendages of toddlers likely puts mothers at a higher risk of acquiring viral and bacteriologic infections. Second, maternal resources are very limited, and time spent on delivering ineffective kisses to boo-boos means that maternal attention is not devoted to other activities that have clearly been shown to be beneficial to toddlers, such as the introduction of algebraic functions and the teaching of conversational Mandarin [8]. Most importantly, reliance on ineffective therapies may delay or prevent the delivery of proven and appropriate medical care, such as Bac-Be-Gone® antibacterial ointment and Steri-Aids® self-adhesive bandages [9].

Although brilliant in its simplicity and robust in its design, our study does have several limitations. First, we only tested children between the ages of 18 and 36 months, limiting generalizability to older or younger children. The ages of 18–36 months, however, represent the peak incidence of boo-boos. In addition, by 5 years of age, many children, perhaps recognizing the ineffectiveness of the practice, overtly reject maternal kisses, especially when peers are present [10]. Our study is also limited in that it only assessed the effect of maternal kisses on the child. It remains possible that mothers themselves confer some psychological benefit from a practice that, at least on its face, appears directed at the child. We did note that many mothers appeared significantly distraught when their child was randomized to an intervention other than maternal kissing. In fact, there is some preliminary evidence to suggest that maternal sense of self-worth and personal happiness is associated with attempts to remedy distress in offspring [11,12]. Multiple emotive comments were directed at researchers throughout the study that led us to believe that mothers were quite invested in the kissing process. The study, however, was not designed to investigate this possibility in either a qualitative or quantitative fashion. More research into the potential psychological effects on mothers of boo-boo kissing is required.

In summary, maternal kissing of boo-boos is a common practice that appears to have no ability to reduce the distress of toddlers and may have significant untoward effects. On the basis of this study, we recommend a moratorium on the practice.

## Conflict of interest

None declared.

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<sup>1</sup> A fully owned subsidiary of Proctor and Johnson, Inc., manufacturers of Bac-Be-Gone ointment and Steri-Aids self-adhesive bandages.