The relations between 'baby-signing', child vocabulary and maternal mind-mindedness

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Abstract

Babysign classes are increasingly popular across the UK. Benefits are said to include increasing child vocabulary, reducing frustration, and improving parent-child relations. A further relationship between the use of babysign and maternal mind-mindedness has been suggested. It was hypothesised here that parents choosing babysign classes would describe their child using more mind-minded comments than those attending other toddler classes and that their children would have greater language skills. The mind-mindedness scores of 34 mother-child dyads attending parent-toddler activities were measured using Meins et al.'s (2010) research protocol. Mothers also completed a communicative checklist for language and gesture use and understanding. Results indicate that mothers who choose to use babysign describe their children with significantly more mind-minded attributes, but language skills do not differ between the two groups of children. This supports the hypothesis that mothers using baby-sign would show more mind-mindedness than mothers not using babysign.

Keywords: child vocabulary, Baby-sign, mind-mindedness

Introduction

Despite the paucity of research offering robust empirical evidence for the benefits of teaching sign to preverbal hearing infants, there are numerous commercial 'Baby signing' programmes available. Extensive claims are made by companies promoting baby sign, suggesting that baby signing not only accelerates infant's language development and enhances children's' intellectual abilities, but also improves the parent child relationship (e.g. http:// http://www.tinytalk.co.uk). While there is some debate about the veracity of these claims (see Nelson, White and Grewe, 2012), it has been suggested that the use of babysign encourages more responsive and sensitive caregiving (Vallatton, 2009, 2012, and Kirk, Howlett, Pine, and Fletcher, 2013). Meins, Fernyhough, de Rosnay, Arnott, Leekam, and Turner, (2012) argue that mind-mindedness (the caregiver's proclivity for treating the child as an intentional being with a mind of his/her own) is a robust means of measuring and quantifying a caregiver's sensitivity and responsiveness to the child. Given this, we might expect to find mothers who are using babysign to be more mind-minded towards their child than mothers who are not using babysign. This exploratory study seeks to directly compare the maternal mind-mindedness of mothers attending babysign classes to the mind-mindedness of mothers attending other, non-communicative, mother-child activities.

In a series of studies, Linda Acredolo and Susan Goodwyn (e.g. Goodwyn and Acredolo, 1993; Goodwyn and Acredolo, 2000) demonstrated that teaching preverbal hearing children baby sign — in the form of symbolic gesture— facilitated vocabulary growth. They trained parents to use baby signs (alongside verbal labels) to refer to objects (e.g. flapping arms for bird, clawing motion for cat) during interactions with children. Children readily acquired the symbolic gestures, and used them to refer to objects and make requests. Goodwyn and Acredolo (2000) contend that using babysign:

(1) enhances expressive and receptive spoken language vocabularies; (2) advances mental development; (3) reduces child frustration, easing problematic behaviours such as tantrums; and (4) improves parent-child relationships. Systematic reviews of the evidence in support of babysigning have been rather more equivocal (Johnston, Durieux-Smith and Bloom, 2005; Doherty-Sneddon, 2008).

Fitzpatrick, Thibert, Grandpierre, and Johnston, 2014), suggesting that babysigning is, thus far, under researched. The systematic reviews suggest that current literature was inadequate in providing strong support for the notion that baby signing promotes language development. Only 17 of 1208 reports reviewed by Johnson et al. and 10 of 1902 studies reviewed by Fitzpatrick et al. met their criteria as empirically investigating the purported benefits of babysign. Methodological flaws, inconsistency in definitions of babysigning and frequently poorly controlled studies limited the number of studies included in systematic reviews. Similarly, Nelson, White, and Grewe, (2012) reviewed the evidence presented by 33 websites promoting teaching babysign to hearing infants. The sites reviewed claimed that babysign would: promote earlier child communication; improve language development; increase child IQ; reduce child tantrums; increase child self-esteem, and improve parent–child bonds. Nelson et al. found that more than 90% of the evidence offered by the websites in support of these claims was not underpinned by empirical research.

Doherty-Sneddon's (2008) review of babysigning literature suggests four mechanisms contributing to the purported benefits of babysign training: (1) it increases parent-child joint attention episodes (correlated with improved language development (Moore, Acredolo and Goodwyn, 2001); (2) it scaffolds the child's attention to the

conversational topic and context; (3) it enables discussion and clarification of concepts; and (4) it adds opportunities to practice symbolic function. However, each of these mechanisms speaks to the child's vocabulary and cognitive growth rather than the improvement in parent-child relations. The notion that babysign improves parent-child relations is supported by Vallatton (2009, 2012) and Kirk et al. (2013).

There are two possible explanations for the proposed improvement in the parent-child relationship as a direct result of babysign. The first explanation relies on the assumption that young children's lack of communicative skill leads to frustration, which then negatively impacts upon parent-child relations. This would appear to be supported by Pizer et al.'s (2007) finding that most people reported their primary motivation for using babysign was to improve communication, in the expectation reducing their child's frustration. An alternative explanation is that using babysign may compel caregivers to view children as communicative partners at an earlier age, and thereby become more responsive to the child.

Vallatton (2009, 2012) and Kirk et al. (2013) support the notion that using babysign compels the caregiver to become more responsive to the child. Vallatton (2012) and Kirk et al. (2013) demonstrated that sign-trained mothers were more responsive to their infants needs than mothers who were not sign-trained. The sign-trained mothers in Vallatton's study tended to view their infants more positively and notice distress more quickly than non-sign-trained mothers. This might suggest that maternal sensitivity or responsiveness is, at least to some extent, a learned behaviour, and that signing might be one route to improving caregiver sensitivity. However, the child's behaviour might also influence caregiver behaviour. Vallatton (2009)

demonstrated that children who used signs tended to elicit more responsiveness from caregivers in a nursery setting than non-signing children. This suggests that it may be the child's sign production that indicates to the caregiver that the child is a communicative partner with a mind of his/her own. This tendency to view the child as communicative partner is, in essence, parental mind-mindedness. Mind-mindedness (MM) is defined as a parent's "proclivity to treat (his or) her infant as an individual with a mind rather than merely as a creature with needs that must be satisfied" (Meins, Fernyhough, Fradley, and Tuckey, 2001. pg 638).

To date, only one study has directly compared the MM scores of mothers using babysign with the MM scores of mothers not using babysign (Kirk et al. 2013). Kirk et al. compared the MM scores of 18 mothers participating in a wider project looking at the relationship between baby sign and linguistic development, 9 of whom were using baby sign. Kirk et al. utilised an observational measure of mind-mindedness, designed for use with children younger than 12 months. No group differences were observed in mind-mindedness scores, but differences were seen in the care-giving behaviour of mothers in each group. In contrast to the non-signing mothers, the babysigning mothers tended to both be more responsive to, and to encourage more independence in their children. This suggests that sign-training had an impact on the mother's caregiving. The mothers in Kirk et al.'s research were randomly assigned to the sign or non sign group, and therefore may differ from a group who have decided to use sign.

The current study extends previous research in several ways. There has been relatively little empirical research that has directly explored the effect of learning babysign on children's vocabulary development. Furthermore, only one previous study

(Kirk et al., 2013) has explored the relationship between maternal mind-mindedness and the use of babysign, but participants were assigned to the sign or non-sign groups, rather than self-selecting their activity. The primary aim of the current study is to directly compare the mind-mindedness of mothers attending babysigning classes with the mind-mindedness of mothers attending other mother-child activities. A further aim is to directly compare the expressive and receptive vocabularies of children using babysign with children not using babysign.

The current study was designed to describe the relation between choice of child activity and maternal mind-mindedness and to compare the vocabulary development of children learning babysign to that of children not learning babysign. Any difference between maternal mind-mindedness in the two groups (babysign versus non-baby sign) would support the notion that mothers who are using babysign are more or less sensitive to their child's internal landscape than mothers who are not using babysign. Furthermore, any difference between the vocabulary scores of children in the two groups (babysign versus non-baby sign) would support the notion that babysign has a facilitative role in scaffolding language development. Alternatively, the absence of a difference would support the notion that babysign has no impact upon language development.

Method

Participants

Mothers of 34 children were recruited from a variety of gesture classes (e.g. Babies can sign, Sing and Sign, TinyTalk), toddler groups (e.g. Babyballet, Tumbletots), by word of mouth and via posters placed around University campuses in the West Yorkshire area of England. The children included two sets of twins and one sibling pair. Mother and child dyads had either attended babysign classes (Babysign group n = 15) or were attending other toddler activities classes (Non-sign group n = 19). Table 1 gives the children's ages by gender and group (Babysign vs Non-sign).

[Table 1 about here]

Measures

Participants provided demographic data and completed the Oxford CDI (Hamilton et al.., 2000). In addition, maternal- mindedness was assessed using Meins and Fernyhough's (2010) brief interview protocol and associated coding scheme.

Parent-Completed Communicative Development Checklist

In order to obtain data on the children's vocabulary development, the Oxford CDI (Hamilton et al.., 2000), a modified version of the MacArthur communicative development inventory (CDI) (Fenson et al.., 1994), was completed by mothers during or immediately after the home visit. The verbal and gestural sections of the checklist have been previously administered to British 9-24 month-olds (Zammit & Schafer 2010). The questionnaire format enables us to gain 'snapshots' of a child's total vocal

and gestural vocabulary, providing a more complete picture than can be observed during sampled interactions.

Maternal mind-mindedness

The mind-mindedness interview is designed for use by 'caregivers of children of preschool age and above' (Meins & Fernyhough, 2010 p.14). Mothers were given an open-ended invitation to describe their child: '*Can you describe [child's name] for me?*' Mothers were informed that there was no right or wrong answer to this question. Maternal responses to the interview question were coded into four exhaustive and exclusive categories: (1) **Mental attributes**- comments that described the child's thoughts, feelings or emotions (e.g. she loves her sister) were coded as mental attributes; (2) **Physical attributes**-- comments that described the child's appearance (e.g. she's beautiful, he's very tall) were coded as physical attributes; (3) **Behavioural attributes**- comments that described the child's behaviour (e.g. she's very cuddly, he is a real climber) were coded as behavioural attributes , and (4) **General attributes**- all other comments were coded as general attributes.

Procedure

Contact was made with the child activity groups and permission sought from the instructor to allow a researcher to attend the group to explain the study and request participation. Alternatively, mothers responded to posters placed around the university campus by emailing a researcher. The participants, all mothers, were then visited at home where the interview took place or came into the university if this was more convenient for them. Questionnaires (demographic and CDI) were posted to parents for completion before the interview.

Semi-structured interviews were audio recorded, and transcribed later. Mothers were asked about the activities they attended with their child and to describe their child to the researcher. The request to describe their child was taken from Meins et al.'s (2010) research protocol for evaluating the mind-mindedness of caregivers for a preschool aged child.

Reliability

Inter-observer reliability measures were obtained on 8 interviews, totalling 29% of the maternal interviews. Robust inter-observer agreement was obtained for maternal comments about children's mental attributes (r=.790, p=.020), behavioural attributes (r=.721, p=.043) and physical attributes (r=.867, p=.005).

Results

Demographic information

The two groups of participants (Babysign and Non-sign) were first compared to ensure equivalence on demographic data, including: maternal age, child age, time spent in daycare (in hours), maternal education, number of siblings and birth order.

Maternal age

There were no significant differences in the age of mothers in the babysign group (N= 12, M = 38.0, SD = 3.7) versus the non-babysign (N = 15, M = 35.5, SD = 3.7), $t(23.5) = 1.69$, $p = 0.10$, $\eta^2 = 0.10$.

Maternal education

Education levels were evenly distributed between the groups, with over 75% of mothers in the babysign and non-babysign groups having achieved at least degree level. A chi-square test showed that there was no significant association between maternal education (Four levels, GCSE/equivalent, A level/equivalent, BA/BSc, Postgraduate) and group (Two levels: babysign and non-babysign), $\chi^2(3) = 5.41$, $p = 0.14$, Cramer's $V = 0.41$.

Child age

There were no significant differences in the ages of children in the babysign group (N=15, M = 19.78, SD = 7.55) versus the non-babysign group (N=19, M = 22.05, SD = 7.98), $t(32) = -.842$, $p = 0.41$, $\eta^2 = -0.06$.

Time spent in daycare (in hours)

There were no significant differences in time spent in daycare between children in the babysign group (N=15, M = 12.9, SD = 12.7) versus the non-babysign group (N=19, M = 15.4, SD = 12.9), $t(32) = -.576$, $p = 0.56$, $\eta^2 = -0.04$.

Siblings.

Within the babysign group, 8 children had siblings and 7 did not. Within the non-babysign group, 9 children had siblings and 10 did not. A chi-square test for independence (with Yates Continuity Correction) showed that there was no significant association between sibling status (Two levels, sibling and no sibling) and group (Two levels: babysign and non-babysign), $\chi^2(1) = .000$, $p = 1.00$, phi = .06. Additionally, 9 children in the babysign group were first born while 6 were not. Within the non-

babysign group, 11 children were first born and 8 were not. A chi-square test for

independence (with Yates Continuity Correction) indicated that there was no

association between birth order (Two levels, first born and not first born) and group

(Two levels: babysign and non-babysign), χ^2 (1) = .09, p = 0.76, phi = -.11.

Child gender/sex

Within the babysign group, 9 children were female and 6 male. Within the non-

babysign group, 11 children were female and 8 were male. A chi-square test for

independence (with Yates Continuity Correction) showed that there was no significant

association between the sex of the child (Two levels, male or female) and group (Two

levels: babysign and non-babysign), χ^2 (1) = .000, p = 1.00, phi = .02.

Because there were no statistically significant differences between the groups on

any of the demographic measures, it was not felt necessary to control for any of them in

the analysis of mind-mindedness. Because age and gender have such a large impact on

language skills, these were included in analyses of child receptive and expressive

language.

Child vocabulary

Mothers completed the Oxford CDI (Hamilton et al.., 2000), detailing each

child's (N = 34) expressive and receptive vocabulary. Mean scores, by group and

gender, can be seen in Table 2.

[Table 2 about here]

Two two-way between-groups ANOVAs were conducted to explore the impact

of sex of the child and group on first receptive and then expressive vocabulary. For both

measures of vocabulary, there was no significant interaction effect between sex and group (Receptive vocabulary: $F(1,30) = .01$, $p = .91$, $\eta^2 = .00$; Expressive vocabulary: $F(1,30) = .03$, $p = .87$, $\eta^2 = .00$). There was no statistically significant main effect for group (Receptive vocabulary: $F(1,30) = 1.07$, $p = .31$, $\eta^2 = .04$; Expressive vocabulary: $F(1,30) = 1.52$, $p = .23$, $\eta^2 = .05$). There was also no statistically significant main effect for sex/gender (Receptive vocabulary: $F(1,30) = 3.34$, $p = .08$, $\eta^2 = .10$; Expressive vocabulary: $F(1,30) = 3.51$, $p = .07$, $\eta^2 = .11$).

Two ANCOVAs, with group as the independent variable, controlling for child age, and with receptive vocabulary as the dependent variable firstly, and expressive vocabulary secondly, revealed that there was no significant difference in receptive or expressive vocabulary scores for the two groups (Receptive vocabulary: $F(1,31) = 0.30$, $p = .59$, $\eta^2 = .01$; Expressive vocabulary: $F(1,31) = 0.64$, $p = .43$, $\eta^2 = .02$). There was a strong relationship between the age of the child and vocabulary scores, as indicated by a partial eta squared value of .66 for receptive vocabulary and .69 for expressive vocabulary.

Maternal mind-mindedness

Maternal mindedness was evaluated using Mein's (2010) research protocol, resulting in a mind-mindedness score for each child ($N = 34$). Mean scores by group can be seen in table 3.

[Table 3 about here].

An independent sample t-test was conducted to compare mind-mindedness scores for the babysign and non-sign groups. In line with hypotheses, Maternal mindmindedness scores were significantly higher in the babysign group than in the non-babysign group $t(32) = 2.44$, $p = .02$, $\eta^2 = 0.16$.

Next, we examined whether there was a relationship between maternal mind-mindedness scores and the receptive and expressive abilities of children. A Pearson's r correlation found no relationship between maternal mind-mindedness and children's receptive vocabulary scores, r (34) = 0.633, p = 0.08. A further Pearson's r correlation found no relationship between maternal mind-mindedness and children's expressive vocabulary scores, r (34) = 0.692, p = 0.07. Therefore, although mothers attending babysign classes had higher mind-mindedness scores than mothers attending non-sign classes, this was not related to their child's communicative ability.

Discussion

The aim of the study was to directly compare the maternal mind-mindedness of mothers attending babysign classes to the mind-mindedness scores of mothers attending other, non-sign, mother-child activities. Mothers in the babysign group had significantly higher mind-mindedness scores than non-sign group mothers. However, there were no differences observed in the demographic characteristics of mothers or children in each group. Similarly, we observed no significant differences in the receptive or expressive vocabulary scores of children attending baby-sign or non-babysign activities. Using babysign with pre-verbal children is therefore associated with significantly higher levels of maternal mind-mindedness, but not with better child language abilities.

There are a number of possible explanations for these findings. It is possible that the data represents a difference in the mind-mindedness of mothers attending babysign versus non-babysign activities that existed before they attended classes. Mind-mindedness (the caregiver's proclivity for treating the child as an intentional being with a mind of his/her own) has been suggested as a robust means of measuring and

quantifying a caregiver's sensitivity and responsiveness to the child (Meins and Fernyhough, 2010). It has been suggested that the use of babysign is associated with more responsive and sensitive caregiving (Vallatton, 2009, 2012, and Kirk et al., 2013). Babysign classes are frequently advertised with the claim that attending will improve the parent child relationship (e.g. http://www.babysigns.com). Therefore, mothers who are more mind-minded towards their child might choose to attend babysign classes rather than or in addition to non-sign classes.

An alternate explanation might be that attending babysign classes increases maternal proclivity to being mind-minded towards their children. It is feasible, for example, that mothers who attended babysign classes started off with mind-minded scores that were no different to other mothers. It has been suggested that attending babysign classes increases maternal responsiveness to the child (Kirk et al., 2013). Vallatton's (2009, 2012) work supports the notion that the child's use of babysign compels the caregiver to become more responsive to the child. As noted above, maternal responsiveness and maternal mind-mindedness are closely linked. Unfortunately, we do not have baseline data on mother's mind-mindedness scores before they began attending classes. Without baseline measures we cannot know whether attending babysign classes increases maternal mind-mindedness, or if mothers who are more mind-minded tend to be more attracted to babysign classes than mothers who are less mind-minded. Further research is planned to investigate this in a longitudinal study.

Kirk et al.'s (2013) research is to our knowledge the only other study that has directly compared the mind-mindedness scores of mothers using baby sign to those of

mothers who were not using baby sign. However, unlike our findings, Kirk et al. observed no group differences in mind-mindedness scores. There are some differences in the research protocol used by Kirk at el and that used in the current study that might go some way to explaining the different findings. The measure of maternal mind-mindedness used by Kirk et al. (2013) is an observational measure of min-mindedness designed for use with children younger than 12 months. The current research used a parent report measure designed by Meins et al. (2010) for use by caregivers of children of preschool age and older. Meins et al.'s measure does not give a specific age range for preschool children, but in the UK this is typically presumed to be from 3 years, because this is the age at which state-funded nursery education is provided. Meins and Fernyhough's (2010) protocol does not specify any measure for children over 12 months but younger than pre-school. The different measures used by Kirk et al. and in this study might have resulted in differences in the mind-mindedness scores of parents in each study. Kirk et al. report an improvement in maternal responsiveness for the mothers using babysign, but no correspondent increase in mind-mindedness. This is surprising in light of the link between maternal responsiveness and maternal mind-mindedness reported by Meins et al. (2010).

An alternative explanation for these findings is that maternal choice of babysign might have mediated the results. The mothers in Kirk et al.'s research were randomly assigned to the babysign or non-babysign group. However, mothers in the current research were already attending their chosen activity, so self-selected to attend babysign or non-babysign classes. Therefore, comparison of our findings to those reported by Kirk would suggest that using babysign can increase maternal responsiveness, but not maternal mind-mindedness. Mind-mindedness might represent an inherent difference

between mothers and that this difference might motivate mothers to attend babysign classes.

Babysign classes are frequently advertised with the claim that attending will improve the child's vocabulary (e.g. http://www.babysigns.com), despite a growing body of research suggesting that babysign has no effect on children's vocabulary growth (e.g. Johnston, Durieux-Smith & Bloom, 2005; Doherty-Sneddon, 2008; Nelson, White and Grewe, 2012). In line with earlier research, we found no relationship between children's receptive or expressive vocabulary and either the choice of activity or maternal mind-mindedness. Pizer (2007) suggested that mothers were primarily motivated to attend babysign classes as a way of improving communication with their child with the expectation that this would reduce the child's frustration. This reveals an underlying assumption that their children are primarily frustrated by the caregiver's failure to understand the child's communicative attempts, and is some evidence of mind-mindedness in that it evidences the caregiver seeing the child as a person with a mind of his or her own. Pizer et al. (2007, p.392) assert that "... the practice and promotion of baby signing are centred on a belief in the importance of infants' thoughts and wishes". This lends weight to the suggestion that mothers who are more mind-minded might be more attracted to babysign than mothers who are less mind-minded because they are more likely to view their pre-verbal infants as potential communicative partners.

In summary, mothers who attended babysign classes scored higher on measures of mind-mindedness than mothers who attended non-sig classes. Mothers may have been drawn to babysign classes because they were higher in mind-mindedness, and

therefore desired better communication with their infants. Alternately, attending babysign classes may have improved maternal mind-mindedness. One possible route for this is through improved maternal responsiveness. Further research is required to tease apart these two explanations.

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Table 1. Description of children in sample.

Group	Gender	N	Age (in months)	
			Mean (SD)	*Range*
Babysign	Male	6	18.1 (2.9)	11.5-24.6
	Female	9	20.9 (2.6)	15.6-26.3
Non-sign	Male	8	20.2 (2.8)	14.5-25.8
	Female	11	23.4 (2.4)	18.6-28.3

Table 2. Descriptive statistics for child vocabulary (expressive and receptive), by group (babysign vs non-sign) and gender.

Group	Gender	N	Expressive vocabulary	Receptive vocabulary
			Mean (SD)	*Mean (SD)*
Babysign	Male	6	64.50 (59.79)	164.67 (89.26)
	Female	9	230.89 (286.56)	290.89 (256.62)
Non-sign	Male	8	178.63 (210.94)	232.50 (201.18)
	Female	11	318.36 (251.10)	375.72 (217.08)

Table 3. Descriptive statistics for Maternal Mind-mindedness by group babysign vs non-sign).

Group	N	MM score
		Mean (SD)
Babysign	15	48.73 (18.26)
Non-sign	19	32.72 (19.54)