Can behaviour during immunisation be used to identify attachment patterns?

A feasibility study.

Abstract

Background Infant attachment is a strong predictor of mental health, and current measures involve placing children into a stressful situation in order to observe how the child uses their primary caregiver to assuage their distress.

Objectives This study aimed to explore observational correlates of attachment patterns during immunisation.

Participants and Setting 18 parent child pairs were included in the study. They were all recruited through a single GP practice.

Methods Infant immunisation videos were observed and coded for parenting behaviours as well as pain promoting and pain reducing strategies. These scores were compared between different attachment groups, as measured with the Manchester Child Attachment Story Task.

Results Parents of securely attached children scored higher on positive Mellow Parenting Observational System behaviours, but not at a statistically significant level. Parents of securely attached children were also significantly more likely to engage in pain reducing behaviours ($p<0.01$) than parents of insecurely attached children.

Conclusions Future research should go on to develop robust, composite measures for attachment informative behaviours in the immunisation situation and test these in a fully powered study.

Keywords; attachment, immunisation, infant, observation, primary care.

What is already known about the topic?

There is a need to develop a new attachment measure because there is no current tool suitable for use in non-specialist settings (e.g. in primary care or paediatric clinics) particularly, as in primary care consultations, where there are significant time constraints.

What this paper adds?

This paper is a proof of the concept that immunisation has the potential to be used as an attachment measure which has great clinical potential. Attachment could be classified without placing a child into an artificial state of distress, as well as providing a measurement which could be used with children of different ages. This gives the potential for earlier diagnosis and treatment of attachment problems.

Attachment

Sroufe (Sroufe 2005) argued that "Nothing can be assessed in infancy that is more important" [than attachment]. Attachment forms the basis of infant responses to separation from their caregiver (Bowlby 1960), how they respond to strangers (Morgan and Ricciuti 1969;Schaffer 1966) and how freely they explore their environment (Ainsworth 1967). Insecure (particularly disorganised) attachment is associated with various mental health problems for example, conduct disorder (van Ijzendoorn et al. 1999), aggressive and hyperactive behaviour problems (Lyons-Ruth et al. 2009), depression and anxiety (Lee and Hankin 2009) and childhood posttraumatic stress symptoms (MacDonald et al. 2008). Approximately 35% of the population will show insecure attachment (Prior and Glaser 2006).

Classifying attachment

Despite various methods of classifying attachment in childhood, a systematic review (Lim et al. 2010), concluded that there is a need to develop a new attachment measure because there is no current tool suitable for use in non-specialist settings (eg in primary care or paediatric clinics) particularly, as in primary care consultations, where there are significant time constraints (O'Connor and Byrne 2007).

Immunisation and attachment

Attachment behaviours are activated when a child is under stress. Most attachment assessments place a child into a stressful situation and then evaluate how they use their primary caregiver to gain comfort. Wilson et al (Wilson et al. 2008) examined the ways in which health visitors (public health nurses) routinely assess parent/child relationships and the authors proposed immunisation clinics as a setting where attachment behaviours could be observed and studied.

A systematic review of psychological interventions for reducing pain and distress during childhood immunisations sought to determine the efficacy of various psychological strategies for reducing pain and distress during the procedure (Chambers et al. 2009). It is clear that children show distress during immunisation, and this distress can be quantified. Consequently, attachment behaviours may be activated and open to observation when a child is being immunised.

In this proof-of-concept study, behaviour during immunisation was assessed using a general measure of parent-child interaction. This approach could allow identification of candidate characteristics of the parent-child relationship during immunisation which might provide information on the attachment status of the child.

Observing immunisation behaviours

The Mellow Parenting Observational System has been developed as an observational tool to quantify aspects of the parent-child relationship (Puckering et al. 1994). It was predicted that behaviours coded on this during immunisation would relate to attachment behaviours, as parental sensitivity to children's cues has been related to secure attachment (Ainsworth et al. 1974). The Mellow Parenting Observational System records the parent's reaction to any incidents of child distress and child requests as well as positive interactions such as playfulness, praise, tone of voice, and physical affect. Negative responses to distress or other negative interactions are also recorded.

Pain behaviours during immunisation

Children with insecure attachment appear to experience or express higher levels of pain than children with secure attachments (Porter et al. 2007). Furthermore, research examining the relationship between parent's behaviour and how children cope during painful surgery suggests that children of parents who engage in non-procedural related talk with their child, who instruct their child to use coping strategies and who direct humour towards their child, experience less pain during their procedure than children of parents who do not engage in these behaviours (Blount et al. 1989). Conversely, children of parents who reassured, apologised to or criticised their child during the procedure experienced more pain than children of parents who did not engage in these behaviours. Chambers et al (Chambers et al. 2002) showed that children whose parents

use pain promoting behaviours experience greater levels of pain, while pain reducing behaviours are associated with lower levels of pain.

Current study

To examine whether behaviours during immunisation, coded by both the Mellow Parenting Observational System and specific pain-related behaviours, relate to attachment as classified in the Manchester Child Attachment Story Task (MCAST). These two measures tap into key characteristics of the parent child relationship which are associated with attachment; warmth and sensitivity as well as a parent's ability to modulate their child's distress.

Method

Participants

Nineteen parent-child pairs took part in the study. One child was removed from the analysis, because he had intellectual disability and was unable to engage in the MCAST. Thus data from 18 parent-child pairs were analysed.

Materials

Manchester Child Attachment Story Task

The Manchester Child Attachment Story Task (MCAST) is a doll play story stem technique which measures attachment patterns in middle childhood (Green et al. 2000). The MCAST works by giving children the beginnings of four stories using a dolls house, each containing an attachment related theme: the hurt knee, illness, nightmare and shopping. For example, a child doll – whose mother doll is in the kitchen – is represented as having stomach ache while watching television in the living room. The interviewer amplifies the intensity of the doll's distress until the child is clearly involved and mildly distressed by what is happening in the scene. At this point the interviewer hands over to the child saying, "What happens next?" The way the child plays out the story thereafter is subjected to structured coding based on both Strange Situation Procedure and Adult Attachment Interview codes and the child is assigned an attachment classification (Green, Stanley, Smith, & Goldwyn 2000). Children who are classified as avoidant, ambivalent and disorganised can be grouped together and termed insecure, resulting in every child being classified as either secure or insecure. In addition, secure, avoidant and ambivalent can be grouped together and classified as organised, resulting in every child being classified as either organised or disorganised. The MCAST has good inter-rater reliability, secure vs. insecure classification (i.e. B vs. A/C/CC), 94% (Kappa 0.88); categorical D vs. non D classification, 82% (Kappa 0.41). (Green, Stanley, Smith, & Goldwyn 2000), and shows concurrent validity against other

well validated measures of attachment, for example, the Adult Attachment Interview (AAI) (Goldwyn et al. 2000).

Mellow Parenting Observational System

The Mellow Parenting Observational System (MPOS) is an observational tool to examine characteristics of the parent-child relationship (Puckering, Rogers, Mills, Cox, & Mattsson-Graff 1994). This system is an event-sampled observational system that can be used to describe the interaction between a parent or carer and a child (Wilson et al. 2010). The system covers six domains; anticipation, autonomy, co-operation, warmth and stimulation and containment of distress each of which has a negative and positive pole which are statistically independent. These codes meet interrater reliability criteria greater than 85% (agreement/agreement and disagreement) (Albertsson-Karlgren et al. 2001). Observers trained to use the system must reach inter-rater reliability criteria greater than 80% (agreement/agreement and disagreement) (Puckering, Rogers, Mills, Cox, & Mattsson-Graff 1994). The current study used the total positive observational events with higher scores being associated with more positive behaviours.

Pain behaviours

Each immunisation video was assessed for the presence and/or absence of both pain reducing and pain promoting behaviours as described in Chambers et al (Chambers, Craig, & Bennett 2002). Pain reducing interactions were described as techniques adopted by the parent to distract the child through nonprocedural talk, humour directed to the child, and commands to engage in coping strategies. In comparison, pain promoting behaviours were described as techniques adopted by the parent which were designed to be reassuring; providing empathy, apologies or mild criticism, which in turn gave control to the child. Each video was coded as either having pain reducing or pain promoting interaction or not having either.

Design and procedure

Participant information sheets and consent forms were sent out to families whose children were due to receive a pre-school immunisation. Invitations were issued over a period of 3 months to all eligible families in the participating general medical practice. These letters were sent out approximately two weeks prior to the appointment.

On the day of their appointment, the researcher approached the parent in the waiting room and checked that they had received the information sheet, answered any questions that the parent may have and confirmed whether they gave consent to take part.

Following consent the researcher joined the family in the health visitor's room and recorded the immunisation procedure with a camcorder. The same personnel, the health visitor and staff nurse, administered the immunisations to every participant, and they followed a similar routine with each child. This routine involved getting the child to sit in the same position; on the parent's knee, facing and hugging them and giving two immunisations, one in each arm, at the same time (two children were given the immunisations separately, one after the other, due to anxiety). The health visitor asked the child to count to five along with them, telling the child it would be over by the time they had counted to five. The child was injected when a count of three was reached and the needle removed when the count had reached five.

The researcher and parent then arranged a suitable time for the researcher to complete the MCAST with the child. This was never done on the same day as the immunisation to ensure the child was not still in distress over the immunisation procedure. The MCAST was conducted either at the GP practice or at the participant's house; whichever the parent preferred. Some, but not all, parents wished to remain present during the MCAST due to the young age of the child.

Following participation, the researcher coded the immunisation tape using the Mellow Parenting Observation System. As the immunisation videos varied in length, only the

minute before and the minute after the immunisation were coded. This was done to measure how the parent prepared the child for immunisation as well as how they comforted the child following the procedure. Four (22%) of the immunisation videos were coded by an additional rater (a psychology student trained to research reliability on the MPOS), to examine whether behaviours displayed during immunisation could be coded reliably. These videos were chosen at random using a computer generated random numbers package. Inter-rater reliability was calculated using Cohen's Kappa statistic. In addition the videos were coded for the presence of pain reducing and pain promoting behaviours.

The MCAST was used to classify attachment and 22% were coded by an additional rater for inter-rater reliability. Attachment classifications were made following participation and done on a separate occasion to Mellow Parenting scoring to try and maintain rating blindness. Attachment groups were compared on immunisation behaviours using tests of difference between the Mellow Parenting scores and attachment groups as well as Chi-Square analysis between the attachment groups and the presence and absence of pain behaviours.

Results

Participants

The mean age of the children was 4.12 years (SD 0.44), and the mean age of the parents was 38.91 years (SD 6.13). Twelve of the children were male. Fourteen mothers and five fathers accompanied their children to be immunised. The socioeconomic status of the families varied considerably in the sample, with areas of residence ranging from the least to most deprived Scottish deprivation categories.

Attachment

The 18 children were given an attachment classification of either secure (50%), avoidant (27.8%) or disorganised (22.2%). There is also an ambivalent category; however none of the participants in this sample were classified as ambivalent. Grouping these classifications together resulted in 50% of the sample being secure, and 50% insecure, while 77.8% of the sample was organised and 22.2% were disorganised.

As this current study involved using the MCAST on children under the validated age range of 4-8, the difference between those under age 4 and those over age 4 was examined. The index of disorganisation was most likely to be affected as disorganisation can be mimicked by developmental immaturity; however there was no difference between disorganisation scores of those under and over the age of 4

t(15)=0.157, p=0.877, therefore the MCAST seemed an appropriate measure of attachment in this sample.

Attachment and Mellow Parenting behaviours

The inter-rater reliability of the Mellow Parenting Observational System as measured using Cohen's Kappa statistic was 0.82 (excellent inter-rater reliability) (Martin and Bateson 1993). The current study used the total positive observed events with higher scores being associated with more positive behaviours. Negative behaviours were too rare to show any discrimination between subjects. The results showed that the mean Mellow Parenting score of secure children was 24 (SD =5.77) compared to 22.44 (SD=9.14) for insecure children. The difference was non significant; (t=0.43, df=16, p=0.67, *Cohen's d*= 0.21). The mean Mellow Parenting score for organised children was 24 (SD=7.72), in comparison to 20.5 (SD=6.66) for the disorganised children. This difference was again non significant; (t=0.82, df=16, p=0.42, *Cohen's d*=0.46). Our pilot data suggests that 170 children would be needed in a definitive study with 80% power to detect differences between Mellow Parenting scores for children with organised and disorganised attachment at the 5% significance level.

Attachment and pain behaviours

As pain-promoting and pain-reducing interactions have been shown to have an effect on the level of pain which a child experiences during immunisation (Chambers, Craig, & Bennett 2002), it was further examined whether these behaviours adopted by the parent related to attachment classification. Pain promoting behaviours comprised any behaviours which were designed to be reassuring. These included the parent apologising to the child or justifying why they needed their immunisation. In this sample, examples of pain promoting behaviours were parents who focussed on reassuring their children by repeatedly telling them that it would be "OK", or that it was not going to be "too sore". More specific pain promoting behaviours were direct apology from the parent for taking their child to be immunised, or explaining the purpose of the immunisation, for example; "you need this so you're well to go to school". These behaviours were considered to give control to the child but were perhaps not developmentally appropriate for the age group. Pain reducing behaviours included those which were designed to be distracting, these included providing the child with a coping strategy or engaging them in nonprocedural talk. Examples of coping strategies which were observed in this sample included instructing the child to look out the window while being immunised or to hug tightly to their parent. Of the parents who engaged in nonprocedural talk, they generally talked about something the child liked, for example, their favourite television program or what they were going to be doing after the procedure. Following observation by the researcher, each video was coded as either containing these behaviours or not containing them. This observational assessment was based on the behaviour descriptions outlined in

Blount et al (Blount, Corbin, Sturges, Wolfe, Prater, & James 1989). The children with differing attachment classifications were then compared according to the presence or absence of these behaviours (Table 1).

Table 1 shows that parents of securely attached children engaged in pain reducing behaviours more than parents of avoidant or disorganised children. In addition, parents of securely attached children engaged in pain promoting behaviours less often than parents of avoidant or disorganised children. All parents of securely attached children engaged in pain reducing behaviours whereas only 33% of parents of insecurely attached children engaged in these behaviours.

Chi-Square analysis was conducted to test for an association between attachment classification (secure vs insecure and organised vs disorganised) and parent behaviours during immunisation (presence or absence of pain reducing and pain-promoting behaviours). Two cells had expected count less than 5, so an exact significance test was selected for Pearson's chi-square. There was a relationship between attachment security and pain reducing behaviours, (X^2(1, N=18) = 9.00, exact p= 0.009). The association was of moderate strength, φ= .707 and thus attachment security accounted for 49.9% of the variance in the presence or absence of pain reducing behaviours.

Although there was an association between attachment security and pain reducing behaviours, there was no significant relationship between attachment security and pain promoting behaviours (X^2(1, N=18) = 0.22, exact p= 1.00). There was also no significant relationship between attachment organisation and pain reducing behaviours (X^2(1, N=18) = 4.02, exact p= 0.08), or attachment organisation and pain promoting behaviours (X^2(1, N=18) = 0.00, exact p= 1.00).

Discussion

In this study, for the first time immunisation was used as an attachment eliciting paradigm. It was assessed whether immunisation behaviours coded using a general measure of the quality of parent-child interaction, the Mellow Parenting Observational System or specific pain promoting and pain reducing behaviours could predict attachment status as classified in the Manchester Child Attachment Story Task (MCAST).

Summary of findings

Parents of secure and organised children scored higher in their positive Mellow Parenting behaviours than parents of insecure and disorganised children, but these differences were not statistically significant. Parents of securely attached children engaged in pain reducing behaviours significantly more often than parents of insecure

children. They also engaged in pain promoting behaviours less often than parents of insecure children but this difference was not significant –possibly attributable to a type II error.

The Mellow Parenting Observational System was expected to relate to attachment as it taps into key characteristics of the parent child relationship which are associated with secure attachment, for example, warmth and sensitivity of the parent. The pain behaviours were measured as they were expected to tap into a parent's ability to assuage their child's distress, which is also associated with attachment. Although these measurements were examining different aspects of the parent child relationship, there was some overlap. Reassurance, for example, would be both a pain promoting behaviour and a positive behaviour depending on the measurement being used. It may be that during this stressful situation, the parent's ability to assuage distress is the most important aspect and this is why pain reducing behaviours showed stronger associations to the child's attachment.

Limitations

There are a number of limitations which need to be acknowledged in this study. Piiri et al (Piira et al. 2007) distinguished between distal and proximal factors involved when a child undergoes a medical procedure. Distal factors include factors which are present before the infant attends their immunisation appointment, for example, gender,

gestational age, temperament and any early painful experiences, whereas proximal factors include those which occur immediately before the immunisation, for example, parental and nurse behaviours. None of the distal factors were investigated in this study and the health visitor was highly skilled at alleviating the anxiety, and did this uniformly with each child, thus minimising proximal factors. In addition parental behaviours could have been affected by the presence of the video camera necessary for completion of the study. These may have had an effect on how the child reacted while being immunised and may have minimised differences between the attachment-related behaviours of parent-child dyads, with the health visitor playing a predominant role.

Attachment behaviours are evident when a child becomes distressed. Immunisation was considered an experience which would distress all children, however when different children were observed, it could be seen that children responded with varying levels of distress. Some children seemed relatively content during the whole procedure, whereas others were extremely distressed. If the procedure did not put the child into a state of distress then it is unlikely that the attachment system would have been activated during the procedure. There are however individual differences between how children experience or display distress in all attachment measures.

A further limitation of the study is that the analysis was done on a small sample; and there were few children with disorganised attachment patterns. This may have led to

type II errors, disguising genuine associations between attachment and behaviour scores during immunisation.

Finally, the MCAST is validated for use with children aged 4-8 years. It was the aim to only use the MCAST on children aged 4 and over, however due to delays getting Health Service ethical approval, some MCASTs had to be conducted before the child's fourth birthday (N=8). In addition, in order to minimise inconvenience to parents, the researcher offered to conduct the MCASTs either at the family's general practice or at their own houses. As parents had varied preferences, testing location varied between participants. Furthermore, as the children were of such a young age, some parents requested that they observe the children while the MCAST was being administered. Although this was discouraged, some parents remained present during its administration (N=7). It is difficult to consider whether these variations between participants would have had an effect on the attachment classification of the children.

Implications and future research

A definitive study using the current design would require approximately 170 parent-child dyads to achieve sufficient statistical power to study Mellow Parenting observations in a similar design to that reported here. A future study should aim to video-record at least this number of children while they are being immunised and code these videos for general parenting, pain reducing and pain promoting behaviours.

Developing an attachment measure based on observation of the immunisation procedure alone has great clinical potential. Attachment could be classified without placing a child into an artificial state of distress, potentially by nurses or primary care physicians, as well as providing a measurement which could be used with children of different ages. The predictive validity for attachment of parent-infant interactions during early infancy immunisations is certainly worthy of further study. This could offer further potential for earlier diagnosis and treatment of attachment difficulties.

Conclusions

In conclusion, it was found that parents of children with secure attachments show more positive behaviours during immunisation as measured by the Mellow Parenting Observational System but the difference was not significant with our small sample. Parents of securely attached children engaged in pain reducing behaviours significantly more often than parents of insecure children. They also engaged in pain promoting behaviours less frequently than parents of insecure children; however this difference was not significant. Future research should go on to develop robust, composite measures for attachment informative behaviours in the immunisation situation and test these in a fully powered study.

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