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The association of children's distress during venepuncture with parent and staff behaviours.

Children find blood tests painful and distressing (Kennedy et al, 2008). The level of distress they experience may be influenced by adults' behaviour (Caes et al 2014). Children's distress and coping behaviour differs according to the source of adult support, e.g. distress behaviour has been linked with parental support and coping behaviour has been associated with staff support (Cohen et al, 2002; Mahoney et al, 2010). However, the evidence focusses predominantly upon verbal behaviour. The limited evidence regarding non-verbal behaviour rarely considers how this might interact with verbal behaviour. Therefore, this paper aims to explore the variables associated with child distress during venepuncture, taking account of both verbal and non-verbal behaviours of staff and parents.

Anxiety relating to medical procedures

Anxiety is a feeling of worry or tension associated with an event or uncertain outcome, and can cause significant distress. Anxiety is more common in children than in adults (Gullone et al, 2001). Medical procedures can be one of the most anxiety-provoking experiences for children, and there is a relationship between the anxiety of the child and their procedure-related distress (Elbedour et al, 1997; Taddio et al, 2012).The majority of literature on procedure-related distress is concerned with the reactions of sick children to medical interventions carried out in hospital settings. There is little evidence regarding children's reactions to procedures such as venepuncture in community settings, where children are usually relatively healthy, despite high levels of distress associated with such procedures (Babl et al, 2012). Failure to manage this distress may impact adversely upon the child (Kennedy et al, 2008), and has been associated with fear and avoidance of medical care in later life (Jones et al, 2008; Pate et al, 1996).

Managing procedure-related distress

Effective management of early venepuncture experiences can ameliorate early fear and anxiety and avoid any impact upon subsequent needle-related medical procedures. Interventions identified as successfully reducing the negative impact of such procedures include application of anaesthetic cream (Tak & van Bon, 2006), information-giving (Hughes, 2012) and behavioural measures such as self-hypnosis and teaching coping techniques (e.g. Kolk et al, 2000; Liossi et al, 2009).

Social support is one of the most common means of influencing reactions to needle-related procedures (Blount et al, 1994). 'Social support' refers to the use of interpersonal mechanisms to protect against stress in both adults and children (Cohen & McKay, 1984; Wilkinson & Marmot, 2003), although it can also have negative effects. For children undergoing needle-related procedures two main types of carer support have been reported: 'coping-promoting behaviour' and 'distress-promoting behaviour'. 'Coping-promoting' behaviour describes activity such as humour and talking about subjects other than what is happening in the room (non-procedural talk) whereas 'distress-promoting' behaviour includes factors such as reassurance, parental anxiety and criticism (Peterson et al., 2007).

Coping-promoting behaviour seems to manage child venepuncture-related distress more effectively than distress-promoting behaviour, particularly where the distress-promoting behaviour is exhibited by a parent (Mahoney et al., 2010). Parents who engage in catastrophic thinking regarding the medical procedure are likely to be more distressed, increasing children's distress and pain (Caes et al, 2014). Mothers may be more likely to catastrophize than fathers, with the catastrophizing rooted in rumination (Hechler et al, 2011). Reassurance, comprising verbal (e.g. "it's OK") and non-verbal (e.g. hugging) behaviour intended to reduce anxiety, appears to be ineffective at reducing child distress during acute pain. Verbal

tone contributes to the effectiveness of reassurance behaviour; dropped tones indicate that the parent is confident and not worried themselves (McMurtry et al, 2010). Furthermore, facial expression – particularly a happy face – influences the child's perception of their parent's state of mind, determining the success of parents' reassuring behaviour (McMurtry et al, 2010). This may explain contradictory evidence around child distress (Vance & Eiser, 2004). In particular, despite exhibiting greater anxiety when parents are present, children overwhelmingly prefer parents to be in attendance during invasive medical procedures (Gonzalez et al, 1989). Therefore it is possible that the extent of distress is affected both by the degree of parental catastrophizing and the effectiveness of their reassurance behaviour.

Distance

Piira et al (2004) reviewed the effect of parents' presence on child distress, concluding that the majority of studies reported either less distress when parents were present or no difference from situations where the parent was absent. It has been argued that some distress reactions are due to the timing of child-parent separation (Blount et al, 1991) or are a natural proximity-seeking behaviour in response to threat (Bowlby, 1982). Non-verbal immediacy behaviours, such as close physical distance, indicate that parties are available for one another, acting as a form of social support (Cutrona & Suhr, 1994). Peterson et al (2007) demonstrated this using an adapted version of Hall's (1969) four categories of distance: intimate (up to 30 cm between individuals), personal (30 to 90 cm), social (90 – 180 cm) and public (over 180 cm). Their study of parent proximity and touch identified that parents were usually within personal distance, with intimate distance used most during the procedure itself. Whilst this represents only a small proportion of the overall clinic time, it does suggest that carers and their children are likely to sit in closer proximity at times of increased threat and, therefore, greater potential anxiety and distress.

Overall, the evidence regarding the relationship between anxiety and venepuncture-related distress is contradictory and tends to focus on either verbal behaviour or non-verbal behaviour but not on the combination of these. Furthermore, few studies have considered the relationship between adult-child distance and distress. However, there is evidence that venepuncture-related distress is not a discrete response to one element of the situation (e.g. McMurtry et al, 2010). Therefore, this paper reports an exploration of venepuncture-related child distress that encompasses verbal and non-verbal behaviour.

Method

Participants

Participants were 50 child and carer dyads attending a hospital in the south of England for a venepuncture procedure and 10 staff members. Staff comprised 6 phlebotomists and 4 nurses. There were 22 male children and 28 female children. Children were aged between seven and sixteen years (Mean = 11.6 years, s.d. = 2.7). Carers, aged 20 to 70 years (Mean = 42.8, s.d. 9.2), were predominantly mothers (N = 40), although fathers (N = 4), grandparents (N = 4), siblings (N = 1) and legal guardians (N = 2) were included. They needed to be able to provide informed consent for themselves and the child in their care; verbal assent was obtained from children. Ethical permission was obtained from the National Health Service Research Ethics Committee

Materials and Procedure

Venepuncture procedures were recorded using an unmanned camera positioned in a corner of the room. Audio-visual recording commenced as participants entered the room and continued until they left; the length of the participants' presence in the room, measured in minutes and seconds, reflected the consultation period. Video footage was converted to AVI

files for coding. A random selection of five percent was cross-coded for reliability purposes. Agreement between coders was high (r = 0.98, p < .001).

Measures. Consultations were video-recorded, analysed and coded according to the variables of interest: staff and carer distress and coping-promoting behaviour, child distress behaviours, touch and distance. Anxiety was assessed using a questionnaire.

Staff and carer distress and coping-promoting behaviour. These were coded using the Child-Adult Medical Procedure Interaction Scale-Revised (CAMPIS-R) (Blount et al, 1997;), a standardised rating scale demonstrating good validity. Coping-promoting includes humour and non-procedure related talk directed to the child and commands to engage in coping behaviour. Distress-promoting includes criticism, reassurance, giving control to the child, apology and empathy. Behaviour was coded throughout the consultation period. The number of occurrences of each type of behaviour was divided by the duration of the consultation to obtain a mean score.

Child distress behaviours. Coding was also conducted using the (CAMPIS-R). 'Child distress behaviours' include crying, screaming, verbal resistance, requesting emotional support, verbal fear, verbal pain, verbal emotion and information seeking. Distress behaviours exhibited whilst the child was in the consultation room were counted and divided by the length of the consultation to obtain a mean score.

Touch. Touch was coded continuously in real time and categorised according to Peterson et al's (2007) system: 'touch', 'no touch' and 'unknown/absent'. 'Touch' is further sub-divided into either instrumental touch (serves a function, e.g. forceful restraint, assistance to remove clothing) or supportive touch (e.g. bodily contact, hugging/kissing, constant

resting/holding,). Average rates for each category were then calculated using a function of total number divided by total procedure duration.

Distance. Distance was also coded continuously in real-time using Peterson et al's (2007) adaptation of Hall's (1969) formula. There were five categories: intimate distance (< 30 cm between carer's and child's heads), personal distance (30 – 90 cm between child and carer), social distance (90 to 180cm), clinical distance (> 180 cm) and unknown/absent (carer not present or distance not measurable).

Child Anxiety. Prior to the venepuncture procedure, both carers and children completed a simple anxiety measure. Children provided a measure of their own anxiety in relation to the impending venepuncture procedure, measured on an eleven point scale ranging from "not anxious at all" (0) to "moderately anxious" (5) through to "severely anxious" (10). If necessary, to ensure that children understood the question, the researcher used a synonym such as "worried" and/or enlisted help from the carer. This permitted a simple, age-appropriate means of assessing anxiety (Kindler et al, 2000).

Analysis

Construction of the path diagram was a two stage process. Correlation analyses identified significant relationships between variables. Significant variables ($p \leq .05$) were then arranged in a sensible pattern in consideration of their temporal relationships, e.g. anxiety was measured pre-procedure and carer behaviour was measured during the procedure meaning that the anxiety variable needed to precede carer behaviour. To test the path diagram, we followed Cohen et al's (1993) method. Variables act as the criterion in turn, with directly associated variables entered as predictors. This permits calculation of standardised regression coefficients for each direct pathway in the model.

Results

Results are reported in three main sections: descriptive statistics, correlation analysis and construction and testing of the path diagram.

Descriptive Statistics.

Results are shown in Table 1. Staff members engaged in coping-promoting behaviour more than they did distress-promoting behaviour, but this difference was not significant ($\chi 2(1596) = 1647.50$, p =.180). Staff engaged in both distress-promoting and coping-promoting behaviour more often than carers ($\chi 2(912) = 1055$, p = .001 and $\chi 2(1302) = 1395.56$, p = .036 respectively). Carers also engaged in coping-promoting behaviour more than distress-promoting behaviour, but this difference was not significant ($\chi 2(744) = 764.23$, p = .296). The most commonly used carer-child distance was personal distance, i.e. 30 to 80 cm, with social, clinical and intimate distances used less often (Mean percentage = 58.7, 14.62, 13.19 and 11.0 respectively). When carers used touch, most time was spent in supportive touch (Mean = 52.21 seconds). Children engaged in distress behaviour for 28% of the total consultation time. They most commonly reported feeling 'moderately anxious' (mean = 4.58; mode = 5) prior to the procedure.

Correlations. Staff distress-promoting behaviour was significantly associated with carer distress-promoting behaviour (r = .44). Child distress was significantly skewed (Mean = 27.61, skewness = .83, standard error = .34) and so was transformed using the square root method. Child distress was significantly positively associated with child anxiety (r = .65), carer distress-promoting behaviour (r = .60), staff distress-promoting behaviour (r = .52) and intimate distance (r = .31).

Anxiety was significantly associated with carer distress-promoting behaviour (r = .62), staff distress-promoting behaviour (r = .31) and intimate distance (r = .38).

Construction and exploration of the path diagram. As staff distress-promoting behaviour, carer distress-promoting behaviour and intimate distance were all correlated directly with child distress, pathways were included from each of these three variables to child distress; child distress was the dependent variable in the model.

Evaluation of the video data identified evidence of staff-driven interaction with the carer and so a pathway was included from staff distress-promoting behaviour to carer distress-promoting behaviour. Anxiety was measured pre-procedure and was correlated with all other variables. Therefore, pathways were included from anxiety to each of: staff distress-promoting behaviour, carer distress-promoting behaviour, intimate distance and child distress. The path diagram is depicted in Figure 1.

[Insert Figure 1]

Regression analyses explored the principal outcomes: child distress, staff distress-promoting behaviour, carer distress-promoting behaviour and intimate distance. For child distress, the regression model explained 56% of the variance. A total of 42% of the variance was explained in carer distress-promoting behaviour, 19% of the variance in staff distress-promoting behaviour, but only 6% of the variance in intimate distance.

The path analysis identified a number of significant relationships between variables (see Figure 1). (a) *Child distress*. Anxiety and intimate distance were significantly associated with child distress ($\beta = .32$, p = .020 and $\beta = .22$, p = .046 respectively), but staff distress-promoting behaviour and carer distress-promoting behaviour were not ($\beta = .23$, p = .076 and $\beta = .27$, p = .069 respectively). (b) *Carer distress promoting behaviour.* Anxiety and staff distress-promoting behaviour were related to carer distress-promoting behaviour (anxiety $\beta = .38$, p = .002 and staff distress-promoting behaviour $\beta = .42$, p = .001). (c) *Staff distress-promoting behaviour*. Anxiety was associated with staff distress-promoting behaviour ($\beta = .44$, p = .002).

Since only child anxiety and intimate distance were significantly associated with child distress, we conducted a final regression analysis in which child anxiety and intimate distance were entered simultaneously in a model with child distress as the dependent variable. This model accounted for 39% of the variance in child distress (R^2=.39, $F_{(2,44)}$ = 13.83, p<.001). Both child anxiety and intimate distance were associated with child distress (β=.50 p < .001 and β = .26, p = .041 respectively). Controlling for child's age made no difference to significant relationships and there were only marginal changes to effect sizes.

Discussion

This study aimed to construct and explore a model of distress in children undergoing venepuncture. To do this, we examined the relationships between staff and parents behaviours identified as significantly related to child distress. These were child anxiety, staff distress-promoting behaviour, carer distress-promoting behaviour and intimate distance. Much of the literature pertaining to child distress relates to needle-related procedures rather than venepuncture per se, and so this paper represents the first model, as far as we are aware, of venepuncture-related child distress.

From the analysis, child anxiety is most strongly associated with children's distress during venepuncture: the greater the child's anxiety the more distress displayed during the venepuncture consultation and procedure. This suggests that anxiety drives the distress experienced by children before and during the procedure (Babl et al, 2012). However, we measured anxiety before children entered the consultation room and distress behaviour during the consultation, but failed to measure both variables across time. This limits interpretation of results.

The results suggest that although staff and carer distress-promoting behaviour are significantly associated with child distress during venepuncture, when the effects of anxiety

and intimate distance are taken into account any significant relationship between these factors disappears. Therefore, staff and carer distress-promoting behaviour may not drive child distress during venepuncture. This is contrary to the literature suggesting that parental behaviour, particularly maternal catastrophizing, is a critical factor in procedure-related child distress (e.g. Caes et al, 2013; Hechler et al, 2011). However, we cannot establish causality from our investigation; the variables involved are likely to be highly co-dependent, as indicated by the large and significant correlations identified in our analysis. Furthermore, our carer sample predominantly comprised mothers and was highly homogeneous which limits the generalizability of the findings.

The other interesting finding is that staff distress-promoting behaviour significantly predicts carer distress-promoting behaviour. This suggests that staff play an important role in carer behaviour – despite the lack of effect in relation to venepuncture-related child distress. However, we have not factored in the effect of verbal tone or facial expression, and it may be that the interaction between the verbal distress-promoting behaviour investigated here and facial expression and vocal tone affects the expression of venepuncture-related child distress (McMurtry et al, 2010).

Our analysis also identified a role for intimate distance in child distress, specifically that the closer the distance between carer and child, the greater the child's distress. This is contrary to the general literature, which suggests either reduced distress from parental presence or no difference from situations where the parent is absent (Piira et al, 2004). The regression analysis did not identify a significant relationship between child anxiety and intimate distance, suggesting that carers do not sit in close proximity to the child in response to perceived anxiety. The complex relationship between anxiety, distance and distress lends itself to other possibilities, including that distance is driven by distress rather than by anxiety.

However, evaluation of the recording also identified other explanations, including staff directing carers to a seat, and the seating arrangements in the room having been pre-arranged. These explanations may interfere with anxiety-related proximity behaviour. Furthermore, if the carer was placed within a certain distance, perhaps close enough to intervene to prevent the threat, then this may increase the child's distress in response to carer failure to protect them from that threat. Such a hypothesis is consistent with Bowlby's theory regarding proximity seeking behaviour (Bowlby, 1982). Clearly, however, firm conclusions regarding this are not possible at this time.

Overall, our analysis is a starting point for understanding children's distress during venepuncture. The sample size in this study is relatively small and so the model would benefit from further testing using a larger sample in order to determine the extent of the role of procedure-driven child anxiety upon distress during venepuncture. Intervention may best be focussed upon encouraging children to develop coping-promoting strategies to deal with the procedure. This would be consistent with other studies reporting positive effects of interventions such as information-giving (Hughes, 2012), self-hypnosis and teaching children coping strategies (Kolk et al., 2000; Liossi et al., 2009). Whilst social support is often helpful in terms of protecting against the effects of stress (Cohen & McKay, 1984), it is entirely possible that teaching coping strategies rather than simply supporting the child may be a far more effective means of managing fear related to venepuncture. Future work, therefore, should compare the effectiveness of social support mechanisms with the use of taught coping strategies in order to determine whether either method is more effective in reducing child anxiety and, ultimately, child distress.

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TABLE 1: Carer & Staff Verbal Behaviour During Venepuncture *(Rate per minute)*

Behaviour	N	Mean	Standard Deviation	Minimum	Maximum
Carer Coping-Promoting	50	.84	.86	0	4.00
Carer Distress-promoting	50	.67	1.17	0	4.81
Staff Coping-Promoting	50	1.44	1.12	0	4.30
Staff Distress-Promoting	50	.73	.87	0	3.30

Figure 1: Regression Model of Venepuncture-related Child Distress