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Topics in Developmental Psychology with the Emphasis on Methodology

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An independent academic psychologist, based in England, who has written extensively on different areas of psychology with an emphasis on the critical stance towards traditional ideas.

A complete listing of his writings at http://kmbpsychology.jottit.com.

CONTENTS

1. THEORY OF MIND AND OTHER RELATED BEHAVIOURS

1.1. SOME EXAMPLES OF RESEARCH ON THE THEORY OF MIND

Theory of mind (ToM) or mentalising [1] is the ability to know that individuals hold beliefs different to our own [2] [3]. For example, a man places an object in a small cupboard and leaves the room. Then a woman enters the room and moves the object to a big cupboard. When the man returns, where will he look for the object (figure 1.1)? Individuals with a ToM will answer, in the small cupboard.

There are different levels of ToM with the main ones being:

- 1st order - The man believes that the ball is in the green box.
- 2nd order - The woman (1) knows that the man (2) believes that the ball is in the green box.
- 3rd order - The woman (1) is aware that she (2) knows that the man (3) believes that the ball is in the green box.
- 4th order - I know (1) that the woman (2) is aware that she (3) knows that the man (4) believes that the ball is in the green box.

[1] Dennett (1987) used the term "intentional stance".

[2] The original work on ToM comes from studies of chimpanzees (Premack and Woodruff 1997).

[3] Apperly and Butterfill (2009) began their article: "More than 25 years of research have taught us a great deal about theory of mind, the ability to ascribe mental states, such as beliefs, desires and intentions, to explain, predict, and justify behaviour. Researchers have learned much about the age at which children reach developmental milestones, about the abilities of non-human animals, about the disruption of theory of mind in developmental disorders such as autism or following brain injury, and about the neural systems involved when people engage in this kind of thinking. However, we seem no nearer to reaching any consensus on the cognitive basis of theory-of-mind abilities..." (p953).

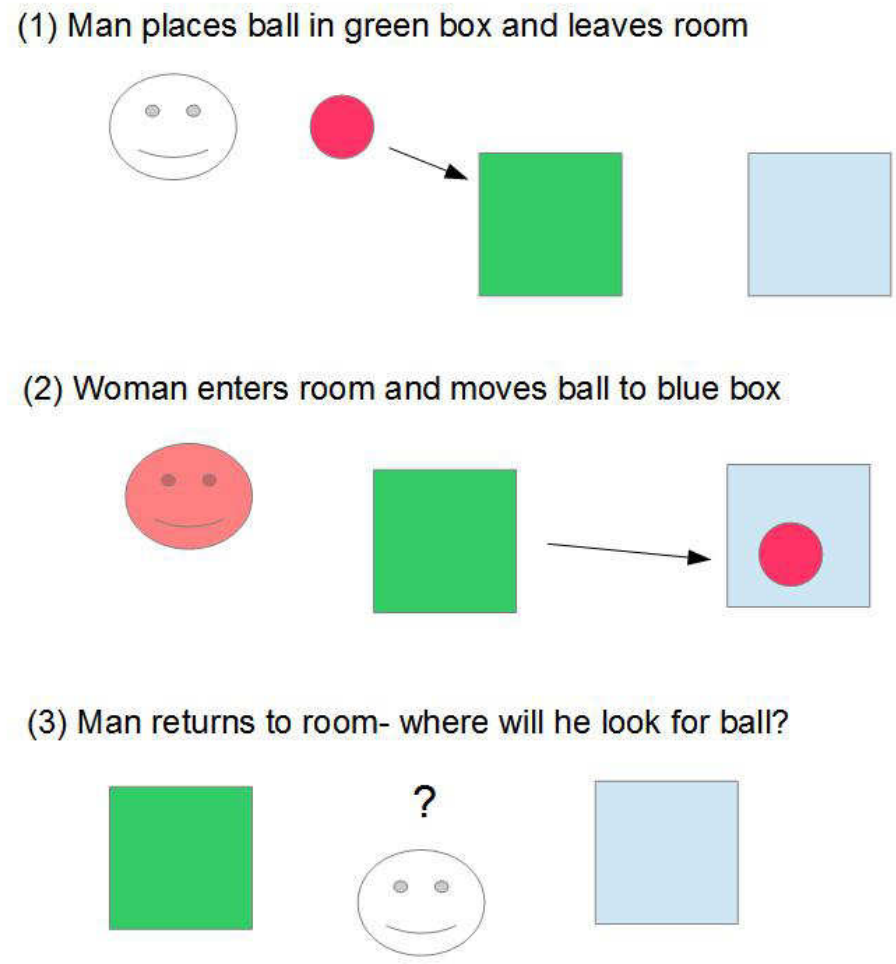


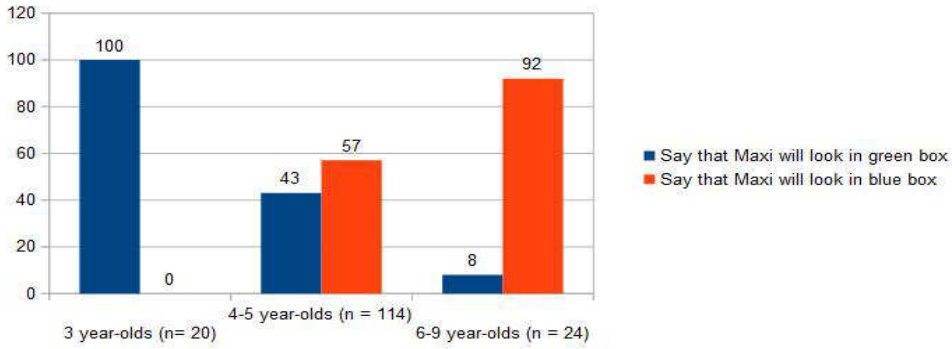
Figure 1.1 - Basis of task to test ToM.

It is possible to continue, but adults struggle with ToM when it becomes 5th and 6th order (Weir 2013).

Research using a children's version of the scenario in figure 1.1 (known as the false-beliefs task or the unexpected transfer task; Flynn 2004) found that ToM develops around 4-5 years old. This is second-order ToM.

Wimmer and Perner (1983) used the story of Maxi, who put his chocolate in the blue box in his bedroom before going out to play. His mother then moves the chocolate to the green box. When Maxi returns, where does he look for his chocolate? Figure 1.2 shows the number of children choosing the different boxes.

But the age change has been challenged by subsequent research. Clements and Perner (1994) found that three year-olds and some two year-olds succeeded at a modified version of the false-beliefs task. For example, a character places the object in one box and leaves the room, then the experimenter moves it, and asks the child



(Choice of blue box = ToM; green box = no ToM)

(Data from Flynn 2004 table 1 p236)

Figure 1.2 - Percentage of children and choice of box.

where the character will look.

ToM may be present by 15 months old (Onishi and Baillargeon 2005) (table 1.1). Young children cannot answer questions, but their length of staring is used as a sign of expectation or surprise. The babies stared longer when the character who had left the room returned and went directly to where the object was hidden now (ie: not where they had left it). This is interpreted as the babies being surprised by the behaviour of the character, as the babies had a theory of mind (Weir 2013).

- Onishi and Baillargeon (2005) used the violation-of-expectation method with fifty-six 15 month-olds. The babies watched a blindfolded adult place an object in one of two boxes (yellow or green), and retrieve it from the same box. This was the familiarisation task that created the expectation. In the experimental condition, the blindfolded adult placed the object in the green box, say, but the baby saw another adult secretly move it to the yellow box.
- The baby will look longer when the expectation is violated if a ToM is present. In other words, in the above example, the baby will look longer if the blindfolded adult reaches for the yellow box than for the green box. The results confirmed that the infants expected the blindfolded adult to reach for the object in the box that the adult had put it. "Whether the actor believed the toy to be hidden in the green or the yellow box and whether this belief was in fact true or false, the infants expected the actor to search on the basis of her belief about the toy's location" (p257).
- The researchers said: "we assume that children are born with an abstract computational system that guides their interpretation of others' behaviour. In this view, even young children appeal to others' mental states - goals, perceptions, and beliefs to make sense of their actions; development involves primarily learning which states underlie which actions and not coming to understand that such states exist at all" (p257).

Table 1.1 - Onishi and Baillargeon (2005).

In a variation on the false-beliefs task, 2-3 year-olds watched a toy being moved by an experimenter while the infant's parent was absent from room, and the children were able to point to the toy's new location when the parent returned (O'Neil 1996). This showed that the children could keep track of others' perceptions.

Kovacs et al (2010) reported evidence of ToM even in seven month-olds. They said: "Children might possess ToM abilities early on; however, these might be masked by the slower development of other abilities involved in such tasks, such as inhibition and selection or problem-solving" (p1830).

Kovacs et al (2010) designed experiments which indirectly measured ToM. Initially, adult participants were asked to detect an object in a cartoon, which was based on the scenarios of false-beliefs tasks. No reference was made to the character in the cartoon who left the room. Participants were significantly slower to detect the object if its location was different to where the cartoon character expected it to be (table 1.2). In other words, the participants were aware of the character's false-beliefs and this slowed down the reaction time.

A modified version was used with seven month-olds, and their looking time [4] confirmed that "humans automatically compute other's beliefs and seem to hold them in mind as alternative representations of the environment" (Kovacs et al 2010 p1834). Paying attention to other's beliefs in a situation, Kovacs et al (2010) called "social sense". It is "one of the cognitive preconditions for the evolution of the uniquely elaborate social structure in humans" (Kovacs et al 2010 p1834).

	Cartoon character	Participant	Condition	Average reaction time in Experiment 1 (msecs)
1	See object hidden behind screen (and not moved).	See object hidden behind screen (and not moved).	Both true belief.	310
2	See object hidden behind screen (then secretly moved).	See object hidden behind screen (then secretly moved).	Both false belief.	320
3	See object hidden behind screen (and secretly moved).	See object hidden behind screen and see move.	Character - false belief; Pp - true belief.	360

Table 1.2 - Basis of different conditions used by Kovacs et al (2010).

[4] A mean of 14 seconds in condition 1 in table compared to 16 seconds in condition 3. This is significantly different ($p = 0.03$).

Some researchers argue that ToM is developed early and there is no fundamental change at four years old, while others suggest that the early successes in tasks are without any understanding of ToM (Apperly and Butterfill 2009).

An alternative explanation for the different findings of age is that the ToM develops twice. Very young children have a basic, implicit version, while the more sophisticated, explicit version develops at 4-5 years old (Apperly and Butterfill 2009) [5]. Apperly and Butterfill (2009) drew a parallel with number cognition. Young infants have a basic understanding of number long before being able to count [6].

Sodian and Frith (1992) (appendix 1A) showed the presence of ToM through the use of deception. Children with a ToM could tell an experimenter that an unlocked box was locked when it was clear that the experimenter believed what was said, but individuals with autism could not do this.

Adults with autism spectrum disorders tend not to develop a ToM, though high-functioning individuals with Asperger Syndrome can pass the false-beliefs task (Senju et al 2009).

Southgate et al (2007) adapted the false-beliefs task for 25 month-olds using eye tracking technology. This measured where the child looked when the adult with a false belief returned to find their object. This showed the anticipation of the individual's behaviour based on their false belief. This "spontaneous mentalising" was not found among a group of individuals with Asperger Syndrome using the same experimental design (Senju et al 2009).

Functional magnetic resonance imaging scans have highlighted a particular area of the brain involved in ToM [7]. Transcranial magnetic stimulation to a specific area here (ie: stopped activity) produced, among adult participants, less attention to an actor's intentions and beliefs in moral judgments (Young et al 2010).

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[5] Apperly and Butterfill (2009) summarised thus: "the success of infants and non-human animals on some belief reasoning tasks may be best explained by a cognitively efficient but inflexible capacity for tracking belief-like states. In humans, this capacity persists in parallel with a later-developing, more flexible but more cognitively demanding theory-of-mind abilities" (p953).

[6] This is called "intuitive mathematics" (appendix 1B).

[7] These areas include the medial prefrontal cortex, precuneus, and temporoparietal junction (Young et al 2010). The medial prefrontal cortex is concerned with representation of the states of the self (Frith and Frith 1999).

1.2. MIND-MINDEDNESS AND STATISTICAL MODELLING

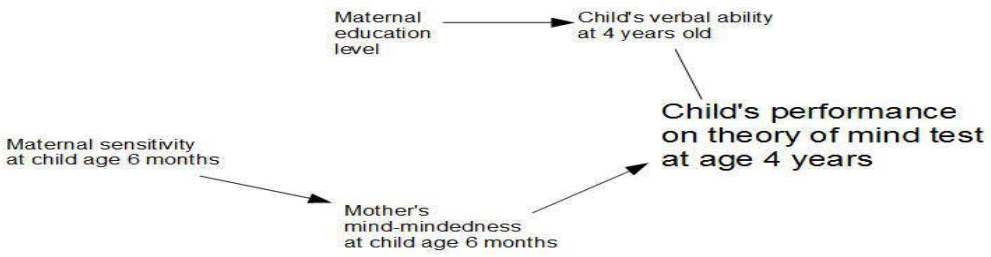
Meins et al (2001) observed 71 mothers with their six month-olds in twenty minutes of free play. The mothers' behaviour and talk (including maternal sensitivity) were scored. For example, the mothers' utterances that made reference to the infants' mental states were recorded. Mothers who "treat her infant as an individual with a mind, rather than merely as a creature with needs that must be satisfied" (Meins et al 2001) were described as "mind-minded" (Oates et al 2005).

At 12 months old, the infants' attachment security was assessed. Children rated as securely attached had mothers with greater maternal sensitivity and who were more mind-minded at six months old.

Meins et al (2002) studied another 57 mother-infant pairs, and found an association between mind-mindedness of the mother at six months old of infant, and the child's ToM at age 4 years (r = 0.33). The ToM ability was also associated with the child's verbal abilities at age 4 years (r = 0.40) [8].

The first relationship is predictive because time is involved, whereas the second relationship is a two-way correlation (ie: verbal ability leads to ToM ability or vice versa). These relationships are the basis of structural equation modelling, which shows how the changes in one or more variables are linked to changes in other variables (George et al 2006).

Meins et al (2002) collected information on other variables which indirectly influenced ToM ability at four years old - maternal sensitivity at six months old correlated with mind-mindedness (r= 0.40), and maternal education level correlated with child's verbal ability (r = 0.55) (figure 1.3).



(Source: George et al 2006)

Figure 1.3 - A model to explain the child's performance on theory of mind tasks at four years old.

[8] In terms of explaining variance (ie: difference between individuals), the correlations have to be squared. This means that maternal mind-mindedness explains 11% of variance of ToM ability, and child's verbal ability 16% (George et al 2006).

1.3. ATTRIBUTION OF MENTAL STATES TO DEAD INDIVIDUALS

As children develop a TOM, they come to understand that others' underlying mental states can be inferred from their behaviour. Thus children pay attention to the behaviour of others to help understand psychological states of the performers (Gopnik and Wellman 1992). But this strategy is challenged by inactive individuals. For example, Flavell et al (1999) found that young children viewed adults daydreaming as thinking about nothing (ie: no mental state because no active behaviour), though these children did attribute mental states to sleeping individuals.

Asking children to make sense of the minds of dead individuals is even more challenging. In other words, trying to find out what children think happens after death. Bering and Bjorklund (2004) (appendix 1C) discovered that children have contradictory understanding of the dead person - eg: no need to eat, but they retain the capacity to be hungry [9]. Understanding of the cessation of mental states on death increases with age. Eleven year-olds, for example, understand that "psychobiological" mental states (eg: hunger [10]) and perception (eg: seeing) stop at death, but they still attribute emotion (eg: anger), desire (eg: wanting), and "epistemic" (eg: knowing) mental states to dead individuals. Pre-school children attribute all the mentioned mental states, except perception, to dead individuals. Even adults can have problems "because knowledge about the fate of mental states after death cannot be informed by first-hand experience, theoretical constructs dealing with the self and others' minds after death suffer from the logical impoverishment of hypothesis disconfirmation. Consciously representing states of unconsciousness poses an impassable cognitive constraint" (Bering et al 2005 p588).

Is the understanding of mental states of dead individuals related to biological knowledge in children? Jaakkola and Slaughter (eg: 2002) argued that children acquiring "information concerning body part location cannot contribute to children's understanding of life and death. Instead, one has to know what the functions of body parts are" (Bering et al 2005 p589).

Another question is whether religious instruction will influence how children understand the mental states

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[9] "It seems strangely counter-intuitive that... children... stated that dead agents did not need to drink water but answered that it was possible for dead agents to be thirty" (Bering and Bjorklund 2004 p224).

[10] This is easier to understand with "cessation reasoning" than other mental states - eg: "Food is required to support life. Dead people are no longer alive. Therefore, dead people cannot be hungry" (Bering et al 2005 p589).

of dead individuals. This is what Bering et al (2005) were interested in studying. They predicted that children at a religious school (Catholic) (with the emphasis on eternal souls) would attribute more mental states after death (ie: less "cessation responses") than children at a secular school in Spain.

The study involved 168 children, of which half attended a religious school and half a secular school. There were three age groups - 5-6, 8-9, and 11-12 years old. Individually the children watched a puppet show where a mouse character ("Baby Mouse") was eaten by an alligator puppet. Then the children were asked if the mouse was still alive. Most of the children knew that the mouse was not alive, and they were asked twelve questions about the state of the animal. The questions were divided into six categories (two questions on each):

- Biological - eg: "Now that Baby Mouse is not alive anymore, do you think he will ever need to eat food again?".
- Psychobiological - eg: "... do you think he's still hungry?".
- Perceptual - eg: "... do you think he still hears the birds singing?".
- Desire - eg: "... do you think he still wants to go home?".
- Emotion - eg: "... do you think he's still angry with his brother?".
- Epistemic - eg: "do you think he's still thinking about his brother?" (Bering et al 2005 p592) [11].

The questions were categorised as "yes", "no" or unscoreable, with "no" classed as a "cessation response" [12].

The number of cessation responses increased with age, particularly for children attending the secular school. The children of all ages were more likely to give cessation responses to the biological, psychobiological, and perceptual questions than to the other three types.

The children were divided into two groups based on their responses - "consistent cessation theorists" (CCTs) (at least 10 of 12 questions answered "no") or not. Based on the age groups, 63% of 11-12 year-olds were CCTs, which is significantly more than 8-9 year-olds (32%) and 5-6 year-olds (13%). The age difference was also affected by school attended with more CCTs at the secular school (figure 1.4).

[11] The methodology is a replication of Bering and Bjorklund (2004) experiment 3.

[12] These are "responses that indicated a cessation of function for particular mental and biological properties as a direct consequence of death" (Bering et al 2005 p598).

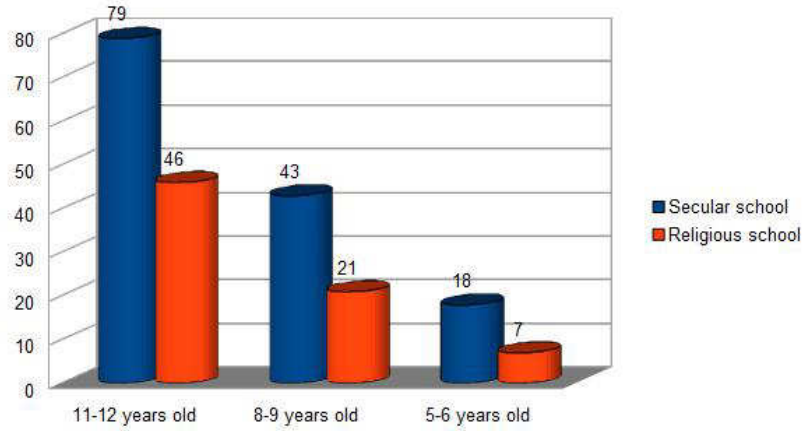


Figure 1.4 - Percentage of children classed as CCTs.

The findings are a replication of Bering and Bjorklund's (2004) study with secularly schooled US children: "these data provide evidence that this general response pattern is not limited to American schoolchildren. However, this statement should be tempered by a note of caution about the generalisability of these data, as cultural groups with more divergent afterlife beliefs than American and Spanish samples would make a more convincing case for their universality" (Bering et al 2005 p598). Note that the sample size of the sub-groups was quite small - eg: 28 children 11-12 years old attending a Catholic school.

Another issue for the researchers was the use of the puppets: "it may be premature to claim that these age-related patterns would be identical for a task involving 'real' characters. Although experimental designs investigating children's reactions to realistic portrayals of death (particularly of human characters) may be seen as ethically dubious to some, future studies should strive to address this important methodological concern" (Bering et al 2005 p601).

But, overall, Bering et al (2005) felt that the "data provide preliminary support for the idea that certain aspects of afterlife beliefs are grounded in cognitive factors that likely operate independently of religious instruction" (p600).

The beliefs in psychological continuity after death, with age, "become progressively pruned to accommodate advances in biological knowledge" (Bering et al 2005). Religious instruction could come into conflict with the increasing understanding. Harris and Gimenez (2005) found this for eleven but not seven year-olds. Children listened to a story about the death of a grandparent, who was said to "be with God now" (religious version) or to "be dead and buried" (secular version). Older children's

cessation responses were more likely with the secular version of the story.

1.4. JOINT ATTENTION SKILLS

Joint attention skills are part of the social development of children. Joint attention is seen as a precursor of the development of ToM (Charman et al 2000) [13].

Joint attention skills include (Striano and Bertin 2005):

i) Attention following - looking in the direction of other's gaze.

ii) Social referencing - check other's reactions in ambiguous situation.

iii) Imitation - copying other's behaviour.

iv) Joint engagement - show and share objects with others [14].

v) Communicative gesturing - eg: pointing.

Some of these skills are linked to ToM because they require an awareness of others' intentions, and other species show some of these behaviours, while humans perform all (Striano and Bertin 2005).

Attention following, for example, seems to require aspects of ToM to know what another person is looking at has meaning to them. However, some researchers have suggested that young children can attention follow without any evidence of ToM. For example, Corkum and Moore (1998) found no spontaneous attention following in six month-olds, but the researchers were able to teach the children through associative learning to follow another's gaze towards an interesting event.

Others have argued that joint attention skills follow a developmental path and systematically appear around and after nine months old, and are thus related skills (eg: Carpenter et al 1998, who tested children on a monthly basis between nine to fifteen months of age). So the key issues are when do joint attention skills appear in young children, the order of development of the different skills, and whether the skills are inter-

[13] Charman et al (2000) found that behaviour on joint attention tasks at 1 year 8 months old predicted ability on ToM tasks at 3 years 8 months old.

[14] Basic joint attention (ie: child and adult interacting), known as "dyadic joint attention", appears from two months old, but joint attention with an object is called "triadic joint attention" (Flynn 2004). Joint attention can be viewed as an example of "scaffolding" (appendix 1D).

related or independent of each other (Striano and Bertin 2005).

Striano and Bertin (2005) found the development of skills before nine months of age, but that the different skills were not related. The researchers studied 72 5-10 month-olds in eastern Germany in six joint attention tasks.

1. Co-ordinated attention - This tested whether the child spontaneously altered their gaze from a toy (given by the experimenter) to the experimenter and back to the toy. Nearly three-quarters of children did this for at least one of two toys given (figure 1.5). The average age of passing the test was eight months old.

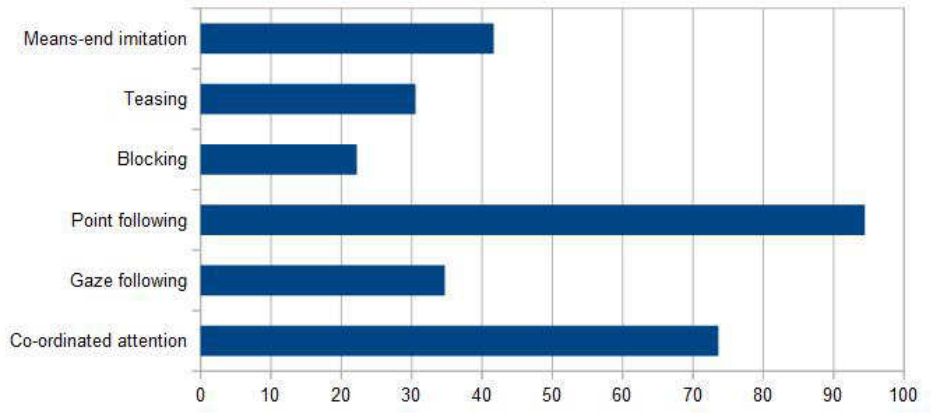
2. Gaze following - The experimenter established eye contact with the child and then turned their gaze towards an object to the left or right. About one-third of children passed this test with an average age of eight months old for successful gaze following.

3. Point following - The same as the previous task. but the experimenter pointed rather than gazed. The average age for passing this test was below eight months old, and 95% of the children were successful.

4. Blocking - The child was given a toy and then the experimenter stopped the child from reaching for it. To pass this test the child had to look at the experimenter's face. Only one-fifth of children passed, but the average age was 7½ months old.

5. Teasing - The child is offered a toy and as they reach for it, the experimenter moves it away. Again to pass the child needs to look at the experimenter's face, which was done by 30% of them. The average age of passing was before eight months old.

6. Means-end imitation - A toy is placed out of reach of the child on a towel, and the experimenter shows the child that by pulling the towel the toy comes into reach. Nearly half the children passed this test with an average age of older than eight months of age.



(Data from Striano and Bertin 2005 table 1 p564)

Figure 1.5 - Percentage of children passing each test.

Looking at the different tasks, the ability to pass them emerged around 8 months old (range: 7-9 months). But there was non consistent pattern of success in one test at one age meaning success in another test a that age. For example, co-ordinated attention was significantly negatively correlated with gaze following (ie: pass one/fail other), whereas it is assumed that they are positively correlated (ie: pass or fail both) [15].

Only two children passed all six tests (and they were nine months old), and one child failed all tests (but they were 8½ months old). Striano and Bertin 92005) said: "The findings of the current study show that joint attention skills do not suddenly appear at the end of the first year, and certainly these skills did not appear in any systematic way, at least in the ages tested. None of the social-cognitive skills that we tested increased significantly between 5 and 10 months of age" (p565).

These findings challenge Carpenter et al (1998) [16], who has been criticised for being too lenient in some of the criteria to pass the tests. There are also differences to Tomasello (1995), who was clear that the abilities did not develop before one year old because children cannot "understand others as intentional agents". Striano and Bertin (2005) admitted that their findings do not necessarily "indicate a general understanding of intentions of others by the end of the first year. As the correlational analyses showed, many of

[15] Striano et al (2007) confirmed the findings with weekly visits to 16 infants between seven and ten months old.

[16] This study is seen as responsible for the idea of "a twelve-month social revolution" (Hoehl and Striano 2013).

the skills that are thought to be linked, such as gaze and point following, were not related to one another. Other skills showed unpredicted relations... which are difficult to interpret and require further research" (p566).

More recently, de Barbaro et al (2013) studied infants at four points between the ages of four and twelve months. They concluded that "joint attention development should be regarded as a 'continuous product of sensorimotor development', rather than indicating a 'social revolution' caused by infants' sudden understanding of others as intentional agents by the end of the first year" (Hoehl and Striano 2013 p249).

Joint attention with an adult seems to help infants encode novel objects by seven months old (Hoehl and Striano 2013). Cleveland et al (2007) presented to 16 five and 15 seven month-olds a novel object (known as "familiarisation object" [17]) either with joint attention (the experimenter alternates their gaze between the object and the child) or not (the experimenter attends to the object) (object only condition). Then the infant is presented with the familiarisation object and a new one. Infants usually pay more attention to novel objects. Five month-olds did not. In this repeated measures study, there was no significant difference in looking times at the novel and familiar object, and between the conditions. The older children looked longer at the novel object only if they had experienced the joint attention condition beforehand. In the joint attention condition, the probability level was $p = 0.022$ [18], and between the conditions it was $p = 0.041$ [19]. The difference in looking time was not significant in the object only condition [20].

The ability to measure event-related potentials (ERPs) (eg: neuronal activity in the brain) has allowed researchers to see that infants are paying attention to objects in joint attention (Hoehl and Striano 2013).

1.5. APPENDIX 1A - SODIAN AND FRITH (1992)

Sodian and Frith (1992) recruited 39 3-5 year-olds, 19 autistic children (6-19 years old), and 29 learning disabled children (10-17 years old) mostly from Munich, Germany (or England).

The children were presented with two glove puppets and sweets ("smarties") in a box. One puppet (white seal)

[17] A toy cat, monkey, frog or chicken.
[18] That is 60.5% of time at novel object and 38.5% at familiar one (means).
[19] Significance is classed as a probability level below 0.05.
[20] That is 49.65% of time at novel and 50.35% at familiar object (means).

gave any sweets found to the child ("nice smartie friend"), while the other puppet ("fierce-looking wolf") kept any sweets found ("nasty smartie eater").

In the sabotage conditions, the children could lock the box containing the sweets if they wanted depending on which puppet was coming. In the deception conditions, the children could tell a puppet that the box was locked or not. Experimental conditions used one or two boxes (table 1.3).

	Sabotage conditions	Deception conditions
One box	Lock box vs leave box open	Say box is locked vs say box is open
Two boxes	Lock full box vs lock empty box	Point to empty box as full of sweets vs point to full box

(Based on Sodian and Frith 1992 table 2 p598)

Table 1.3 - Different conditions in experiment.

In the sabotage condition with one box, all three groups of children were equally good at locking the box to stop the wolf puppet getting the sweets. In the sabotage condition with two boxes, the normal children did significantly better at locking the full box than the other two groups. In the deception conditions, the autistic children were significantly poorer at telling a lie with one box to the wolf puppet or deceptively pointing to the empty of the two boxes. The learning disabled children were similar to the healthy children with one box, but poorer with two boxes.

One criticism of the experiment is that it requires understanding of the "fairly elaborate" language used - eg: "do you want to say it is locked or do you want to say it is open?".

1.6. APPENDIX 1B - INTUITIVE MATHEMATICS

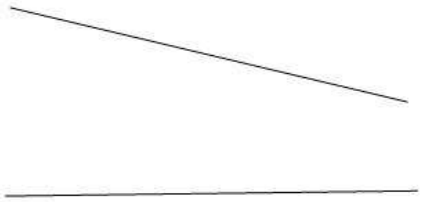
Intuitive mathematics is the idea that children (and uneducated adults or even non-human animals) understand certain mathematical principles without training/education or conscious knowledge [21].

In terms of intuitive geometry [22], a simple example would be following the shortest straight path to a given location.

[21] Recent research has highlighted the areas of the brain active during mathematics (appendix 1B1).
[22] Sometimes called Euclidean geometry (Izard et al 2011).

Izard et al (2011) found an intuitive understanding of geometry among the Mundurucu people in the Amazon [23], who have no formal education on mathematics. Thirty individuals from isolated areas were tested, of which eight were children (aged 7-13 years old). Control groups of adult and children from the USA, and children from France were used.

The first test related to the intuitive knowledge of straight lines. The participants were presented with different lines on a flat plane or on a sphere, and asked questions about them (eg: do two parallel lines cross?) (figure 1.6). The questions were presented in the context of paths to villages, which made sense to the Mundurucu, in particular. Of 21 questions, the Mundurucu participants got an average of 83% correct (which is significantly higher than chance - ie: 50%). Accuracy was better for lines on a flat plain (over 90% correct) than on a sphere (70%), which matched the control groups.



a) Do the lines cross on right side (small-angle side)?
b) Do the lines cross on the left side (large-angle side)?

On flat plane, answer "yes"

a) 100% - Mundurucu children; US adults; French children.
95% - Mundurucu adults

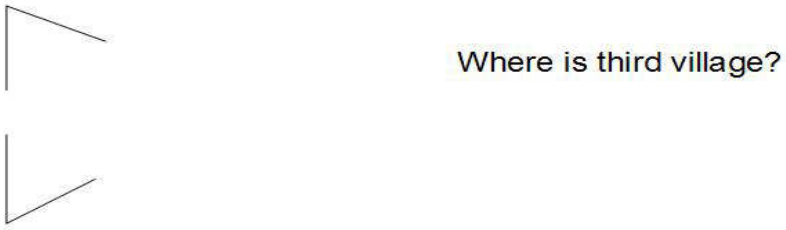
b) 0%
except 2.3% Mundurucu adults.

(Source: Izard et al 2011 table 1 p9783 and table S2)

Figure 1.6 - Example of questions about straight lines.

The second test involved triangle completion. Two angles of the triangle were shown and the participant had to complete the third. The context was the position of two villages and finding a third (figure 1.7). The Mundurucu participants were similar to the control participants in accuracy.

[23] Their territorial lands are south of Jacereacanga, Para state, Brazil (http://pib.socioambiental.org/en/povo/munduruku/795).



(Based on Izard et al 2011 figure 2A p9785)

Figure 1.7 - Example of triangle completion task.

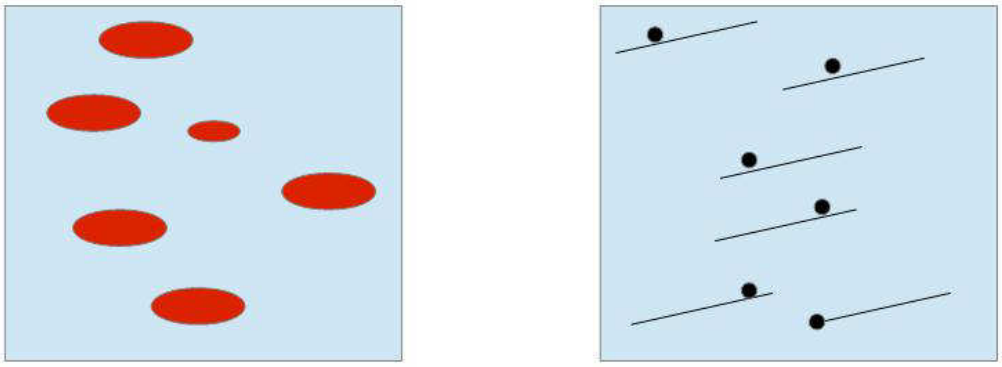
Dillon et al (2013) explored different aspects of intuitive geometry with 45 US four year-olds.

i) Navigation task - The children stood individually in the middle of a large rectangle and watched the experimenter hide a sticker under a disk in one of two corners. The children were then disoriented by being blindfolded and spun around. The blindfold was removed, and the children searched for the sticker. Three different sized rectangles were used: 144 cm x 96 cm (6:9 ratio), 128 cm x 96 cm (6:8 ratio), and 112 cm x 96 cm (6:7 ratio).

The children found the hidden sticker significantly more often than chance in the first two rectangles. The greater the difference between the length and the width, the easier for the children to use that as a cue to the location of the object.

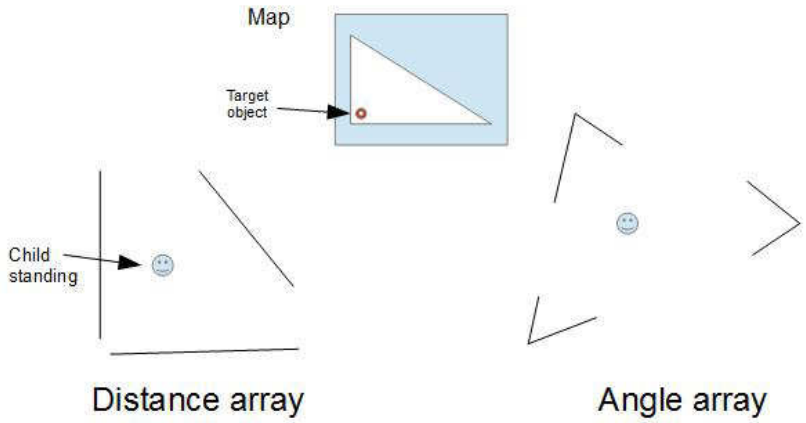
ii) Visual form analysis task - The children were presented with six shapes (eg: circles) on a computer screen, and asked to pick the odd one out. The deviant in each case varied in symmetry or proportional length, for example. The children were successful on eleven of sixteen trials on average (figure 1.8). Most children chose the smaller shape in each trial.

iii) Map-based navigation task - The children stood in the middle of a triangle with either the corners missing (distance array) or the lengths (angle array), and had to go where an object would have been using an intact map of the triangle (figure 1.9). Children were more successful when the object was placed at a geometrically distinct location (eg: corner), which suggested that they were using geometric information when searching for items.



(Based on Dillon et al 2013 figure 1B p14192)

Figure 1.8 - Examples of visual form analysis tasks where children successful (left) and unsuccessful (right).



(Based on Dillon et al 2013 figures 2A-C p14193)

Figure 1.9 - Map-based navigation task.

The children's ability on the navigation task predicted their success on the map-based task where corners were missing from the triangles, but their success on the visual form analysis task predicted the ability in the map-based task when lengths missing. The findings showed that the four year olds had not integrated the representations of distance and angle yet (not until 6-10 years old) (Dillon et al 2013).

1.6.1. Appendix 1B1 - Neuroimaging and Mathematics

Naturalistic neuroimaging studies collect data while

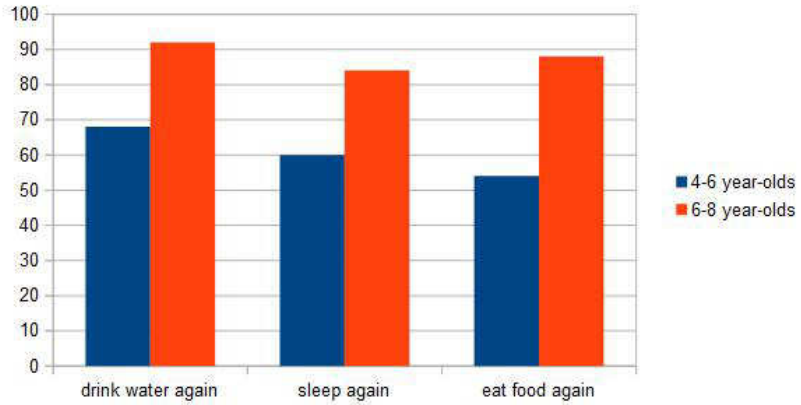
the individual is viewing a real-life stimulus (eg: television programme) rather than an artificial one (eg: isolated pictures).

For example, Cantlon and Li (2013) showed clips of the US educational programme, "Sesame Street", to twenty-seven 4-11 year-olds while in a fMRI scanner. Later the children took two standardised IQ tests. The researchers developed a map of the "neural maturity" of the children (ie: amount of brain activity in response to the television programme). Activity in the intraparietal sulcus (particularly in the right hemisphere) in response to numbers in "Sesame Street" was associated with children's scores on the mathematics-related IQ test, while the neural maturity in the Broca's area in response to words was linked to verbal IQ scores.

1.7. APPENDIX 1C - BERING AND BJORKLUND (2004)

Experiment 1

Twenty-six 6-8 year-olds and 25 4-6 year-olds from the suburban metropolitan area of south Florida, USA) were shown a puppet show where a mouse was eaten by an alligator, and then asked ten questions about the biological functioning of the dead mouse. Older children were significantly more likely to give discontinuity responses (ie: answer "no" to questions like "Will he ever need to drink water again?") (overall mean: 91% vs 78% of 4-6 year-olds) (figure 1.10) [24].



(Data from Bering and Bjorklund 2004 table 1 p220)

Figure 1.10 - Percentage of children answering "no" to selected questions about dead mouse.

[24] Referring to potential ethical concerns, Bering and Bjorklund (2004) used "not alive" rather than "dead", and parents and teachers were happier with this choice.

Experiment 2

This experiment had the same puppet show with 29 4-6 year-olds, 33 6-8 year-olds, and 20 10-12 year-olds. The questions asked about the dead mouse's psychobiology (eg: "Is he still hungry?") and cognitive (eg: "Does he still want to go home?") states. Overall, the older children were more likely to say "no" to both sets of questions, but it was easier for all children to see discontinuity in psychobiological than cognitive states.

Experiment 3

This experiment involved 35 3-6 year-olds, 31 10-12 year-olds, and 20 undergraduates at Florida Atlantic University (as controls). There were six types of questions after the puppet show (as used by Bering et al 2005). Only 14% of young children answered "no" to all questions compared to 35% of older children and 40% of students.

1.8. APPENDIX 1D - SCAFFOLDING

Scaffolding is "supporting learners to engage content that they may not be quite ready to embrace independently" (Renninger and Granott 2005 p111). Wood et al (1976) coined the term to describe situations like a teacher's help of a pupil solving a puzzle. The teacher does not give the answer directly nor is the pupil left alone to solve it. The teacher gives hints and pointers where appropriate or needed by the pupil.

Scaffolding is not necessarily related to formal learning. Wood et al (1976) described three processes involved in joint attention, for example, between a mother and a baby.

- Modelling - the mother models what can be done.
- Cueing - the mother indicates the appropriate format for the situation.
- "Resisting the ante" - the mother encourages the children to elaborate on the format (Oates 2005).

For example, a mother moving an object in front of a four-week old. The mother may say something to gain the child's attention or model the eye tracking behaviour. The object is moved horizontally in front of the child (not too fast or too slow) to cue the appropriate format (side-to-side eye tracking). When this is achieved, "raising the ante" might involve moving the object vertically to encourage up and down eye tracking.

Different types of scaffolding have been

distinguished including "redundant" (help at a particular point in a task for all learners), "differentiated" (different help for different learners), and "synergistic" (multiple forms of help on the same task from different sources) (Renninger and Granott 2005).

Scaffolding can be achieved by teacher and pupil, parent and child, clinician and patient, and by a group of people (eg: peers), a text, or a software as well (and the self). "Scaffolding captures the notion of reciprocal exchange, where participants adjust the way in which they understand something in relation to each other...Scaffolding is a process that changes – the content and the structure of the interactions between the person doing the scaffolding and the person being scaffolded change over time in relation to the strengths and needs of the person who is being scaffolded" (Renninger and Granott 2005 p111).

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2. PRO-SOCIAL LYING

2.1 INTRODUCTION

As children grow, their understanding of moral knowledge develops, particularly in relation to lying and truth-telling. Not only do children have to learn about the rights and wrongs of such behaviour, but to navigate their way through the complexities of social behaviour. In other words, there are times when lying is socially acceptable and desirable ("pro-social lies"; eg: faking liking of an unwanted gift to protect the gift-giver's feelings) as well as lying that violates moral rules ("anti-social lies") (Xu et al 2010) [25].

In terms of the latter, conceptual understanding begins at three years old (eg: Talwar et al 2002; appendix 2B).

Pro-social lying requires an understanding of social conventional rules and the concept of politeness. This ability begins around four years old (Xu et al 2010). Then there is the actual behaviour itself.

2.2. EXAMPLES OF STUDIES

Talwar and Lee (2002) showed that the majority of 98 3-7 year-olds could tell pro-social lies. An adult has an obvious lipstick mark on their nose as they are about to be photographed by the child. At this point, the adult asks the child, "Before you take the picture of me, do I look okay for the picture?", and 89% of the children said that the adult looked okay [26]. Later, the children admitted to the experimenter that the adult did not look okay ("white lie-tellers").

Xu et al (2010) noted: "Thus, the researchers concluded that young children can tell pro-social lies in a politeness situation. However, because children were not probed about why they told such a lie, it is unclear whether the children in the study considered the contradictory rules evoked by the situation when deciding

[25] Understanding the feelings of others is part of empathy (appendix 2A).

[26] This was 55 of 62 children in the experimental condition, while the other seven children told the adult about the mark on the nose ("candid truth-tellers"). There was a control condition where the adult had no mark on the nose.

to lie. Furthermore, among the children who lied, it was unclear as to whether they told lies to spare the feelings of the experimenter (a pro-social lie) or to avoid potential negative consequences if the truth was told (a self-protective lie)" (p583).

Similarly, in another study, with Chinese children (Fu and Lee 2007), it was unclear why the children lied (Xu et al 2010). Here, many 3-6 year-olds said that poorly drawn pictures were better than they were in front of the drawer than when absent (table 2.1).

- Experiment 1 - 159 3-5 year-olds from a large Eastern Chinese city shown nine figure drawings (three poor quality, three medium, and three excellent) and asked to rate them on seven-point scale (from "very good" to "very bad"). This was done with the experimenter, who left the room, and an adult confederate came in and asked the children to rate two drawings again (saying that he had drawn one of them). Would the children change (improve) their rating in front of the confederate from earlier with the experimenter (ie: "flattery behaviour")? The five year-olds significantly improved their rating. But Fu and Lee noted: "Children might have felt intimidated and therefore coerced to increase their ratings in front of the confederate".

- Experiment 2 - 60 6 year-olds from the same Chinese city performed the same experiment as above, but now the confederate was an adult in one condition and a six year-old in the other condition. The children changed their rating in front of both the adult and the child confederate.

- Experiment 3 - 66 more 6 year-olds involved the same procedure, but the confederate varied - familiar or unfamiliar teacher, or familiar or unfamiliar six year-old. The children significantly improved their rating more for the familiar confederates than the unfamiliar ones (figure 2.1).

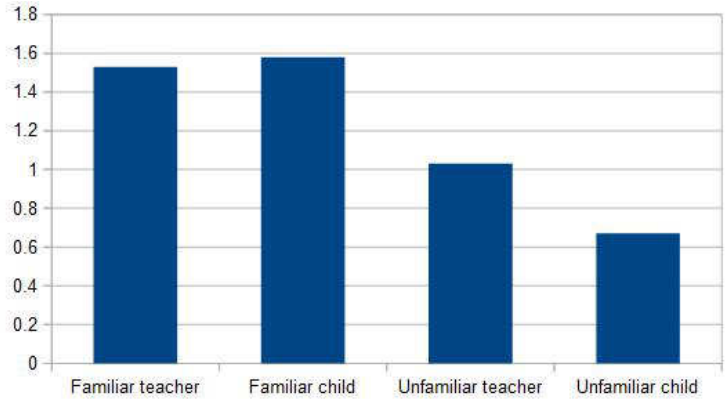
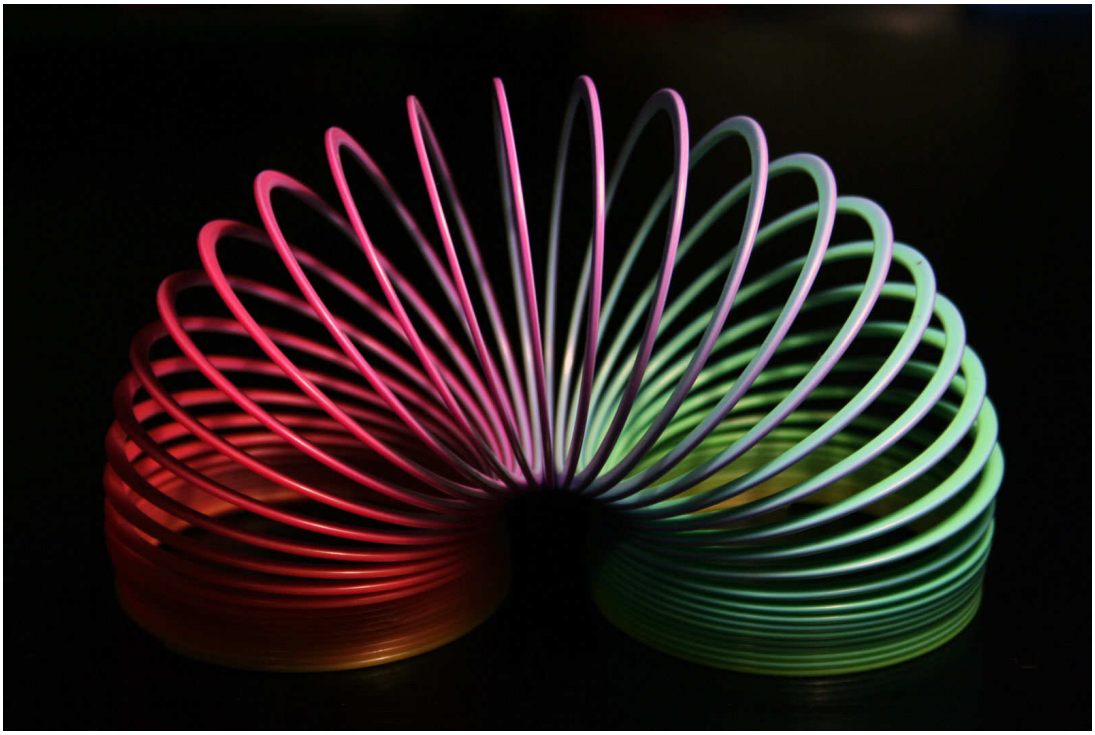


Figure 2.1 - Mean improvement in rating of drawing when confederate present compared to when experimenter present.

Table 2.1 - Details of Fu and Lee (2007).

Xu et al (2010) also criticised a study by Talwar et al (2007) for the same reason. It used the "disappointing

gift paradigm". Children (323 3-11 year-olds from a "medium-sized North American city") played a game believing that they would receive a gift afterwards from a gift basket that included a desirable (a rainbow-coloured slinky; figure 2.2) and an undesirable (plain white soap) gift. The children were given the soap, and asked if they liked it [27]. Most children (68% [28]) lied that they did, but later admitted to a parent not liking it.



(Source: Enoch Lau)

Figure 2.2 - A rainbow-coloured slinky.

Xu et al (2010) investigated children's understanding of a pro-social lie, and their actual use of them with 120 Chinese children (aged 7, 9, and 11 years old). Firstly, the children's understanding of social conventional rules was tested with four hypothetical politeness stories - one pro-social lie-telling (table 2.2), one blunt truth-telling, and two control stories. The children were asked to rate the behaviour of the character in the story (on a seven-point scale from "very very good" to "very very bad"). As the children aged, they rated the lies less negatively.

[27] The control group were given the desirable gift.
[28] This sub-divides to 72% of 3-5 year-olds, 80% of 6-8 year-olds, and 84% of 9-11 year-olds.

- This is Ming Ming. He did very well in a math competition. His teacher gave him a pencil box as a gift. But Ming Ming already had many pencil boxes at home. He did not want any more of this kind of pencil box. So Ming Ming didn't like the gift his teacher gave him. The teacher asked him: "Do you like the pencil box?". Ming Ming said: "Yes, I like it very much" (p586).

Table 2.2 - Pro-social lie-telling story used by Xu et al (2010).

The actual behaviour of pro-social lying was tested by the undesirable gift paradigm. The child was given an undesirable gift by a teacher and asked if they liked it. Later, the experimenter give the child the opportunity to swap the gift for another, and this established if the child had been pro-social lying. Pro-social lying increased with age (40% of youngest children to 60% of oldest children).

Overall, the children's rating of pro-social lying in the hypothetical stories was related to their use of it to the teacher. Thus, a link between moral knowledge and moral action.

2.3. APPENDIX 2A - EMPATHY

Empathy is "a vicarious socio-emotional response that is induced by the perception of another individual's affective state" (Roth-Hanania et al 2011 p448) (ie: feeling an emotion similar to that experienced by another person).

Hoffman's (1975) original four-stage model of empathy development [29] proposed that true other-oriented empathy did not appear until after one year old. This "empathetic concern" (or "sympathy") involves focus on the other person in distress, say, and feeling for them. Prior to that, infants show "empathetic distress" (or "personal distress") (ie: a self-focused form of empathetic feeling - eg: feelings of disturbance or anxiety in response to other's distress). Roth-Hanania et al (2011) provided experimental evidence to question this idea.

The common method used with young babies is to play them the cries of another infant and observe the response (usually "contagious crying"). Roth-Hanania et al (2011) used this technique, and maternal distress simulations.

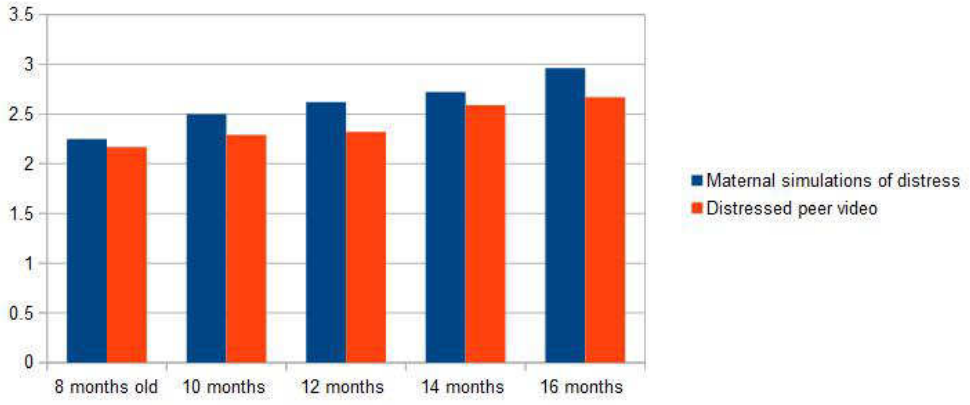
Thirty-seven infants from a city in the eastern USA were tested at three points between the ages of eight and sixteen months old. But this was an "accelerated-longitudinal design", which meant that none of the

[29] Later Hoffman (eg: 2000) proposed five stages.

children were followed for the whole period [30]. One-third of the children were tested at 8, 10 and 12 months old, one-third at 10, 12 and 14 months, and the others at 12, 14 and 16 months old.

The children were tested in their homes. There were two simulations of maternal distress. The first involved the mother pretending to bump her knee on a chair and feign distress for sixty seconds, and the other was pretending to hit her finger while playing with a toy hammer with the child. The peer crying was provided via a video lasting sixty seconds. The empathic response of the infant was coded on a four-point scale [31].

The mean scores for the child at different ages was around 2 for both peer crying and maternal simulations (figure 2.3), which suggested that "modest levels of other-oriented empathy were already evident before the second year of life" (Roth-Hanania et al 2011 p451). However, pro-social behaviour (as in comforting the victim) did not appear until 10 months old for the "hurt knee" or older for the other tests, and even by 16 months old it was only a minority of children.



(Data from Roth-Hanania et al 2011 table 2 p452)

Figure 2.3 - Mean scores on empathy (out of 4).

2.4. APPENDIX 2B - TALWAR ET AL (2002)

This study made up of three experiments tested children understanding of a lie, and their use of anti-social lying.

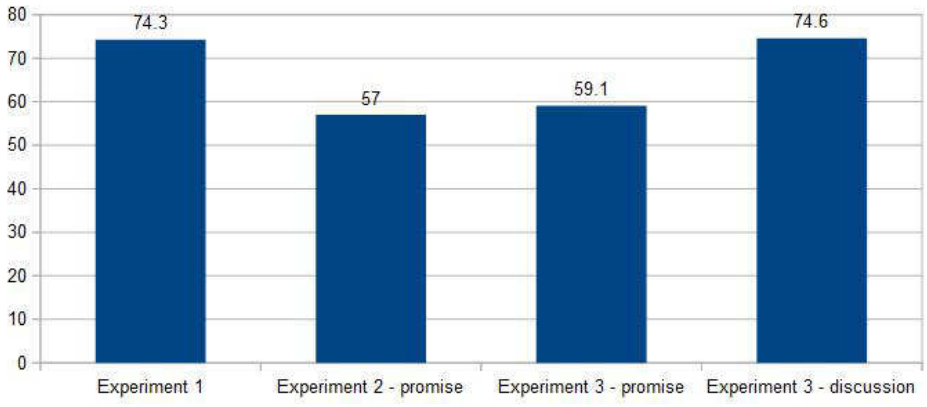
[30] It is actually a combination of the longitudinal and cross-sectional methods.

[31] For example: 4 = substantial ("sustained sadness expressed in sympathetic vocal tones, cooing, or facial expressions, eg: a sympathetic face in which eyebrows are drawn down and brow drawn up over the nose, or a sad expression with corners of the mouth drawn downward") (Roth-Hanania et al 2011 p451).

In the first experiment, 123 3-7 year olds told a hypothetical story about a girl who eat a sweet that she should not have, and then said she had not eaten it. Most children could tell what was a lie and what was true (conceptual understanding). Then the children played a game individually with the experimenter which involved guessing the toy from the sound made. The experimenter leaves the room, and tells the child not to peek at the toy (action component). About two-thirds of children peeked at the next toy in the game, and of them, three-quarters said that they had not looked. There was no relationship between the conceptual understanding of anti-social lying and using it to protect themselves.

In the second experiment, 103 more children followed the same procedure, but were asked to promise to tell the truth before the experimenter posed the question of whether they peeked at the toy while alone. In this case, 57% of peekers lied, and there was a relationship between understanding the concept of lying and using it.

The final experiment (similar to the previous one) compared the promise to tell the truth with a discussion about lying. Less children lied in the promise condition than the discussion condition (figure 2.4).



(Data from Talwar et al 2002 table 2 p400)

Figure 2.4 - Percentage of children lying in three experiments.

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3. PARENTING BEHAVIOUR

3.1. SOME EFFECTS OF PARENTING BEHAVIOUR

Children in the UK are generally healthier and wealthier than in the past (Layard and Dunn 2009), but adolescent behaviour problems continue to rise, and this "does not appear to be artefactual" (Scott 2010). A major part of the reason is the changing world, in particular in relation to the family unit (as well as relative poverty, for example) (Scott 2010).

Put another way, the quality of the parent-child relationship is key. Thus the arguments for parenting programmes (eg: 12-week Incredible Years programme for parents of 3-8 year-olds) (Scott 2010).

Davidov and Grusec (2006) found associations between two aspects of parenting and children's later behaviour, but only for mothers and sons [32].

a) Sensitivity to child's distress and child managing negative emotions, which was, in turn, related to child's level of empathy.

b) Parental warmth and affection and child managing positive emotions, which was, in turn, related to number of friends the child would have.

Put simply, sensitive mothers produce empathetic sons, and warm and affectionate mothering leads to popular sons at 6-8 years old. The aspects of parenting were not associated the other way around (eg: sensitivity to distress and popularity).

Among 102 mothers and 4-6 year-olds in Konstanz, Germany, Von Suchodoletz et al (2011) found that maternal warmth was significantly associated with the children's behaviour regulation (ie: self-control; appendix 3B) (r =

[32] There is a lot of research of children raised without parents or good quality parenting (appendix 3A).

+0.29), while maternal responsiveness to child's distress was significantly associated with the child's internalisation of rules of conduct (r = +0.21).

A number of different measures were used by the researchers:

- Maternal warmth - The Child-Rearing Practices Report Q-Sort (CRPR Q-Sort) (Roberts 1999). This has 99 statement cards (eg: "My child and I have warm, intimate times together"), which are sorted by the mother into nine piles of eleven cards from "these cards are most undescriptive" (1) to "these cards are most descriptive" (9).

- Maternal responsiveness to child's distress - The Coping with Children's Negative Emotions Scale (CCNES) (Fabes et al 2002). This involves twelve hypothetical situations of common emotional event experienced by many children (eg: falling off bike), and mothers score six responses (emotion-focused, problem-focused, encouraging, distress, punishment, and minimised) in each case on 1 ("very unlikely") to 7 ("very likely").

- Child's behaviour regulation - (a) Snack Delay task (Goldsmith et al 1993) [33]. The child is offered a sweet but had to wait a period of time until a bell rang before eating it (eg: thirty seconds).

  (b) The Children's Behaviour Question (Rothbart et al 2001). This has 94 items (eg: "my child approaches sites, it has been told, that they are dangerous, slowly and carefully") rated on a seven-point scale by the mother.

- Child's internalisation of rules of conduct - The Maternal Reports of Conscience Development (MRCD) (Kochanska et al 1994). The mother rated 43 statements (eg: my child will spontaneously admit fault or wrongdoing, either verbally or non-verbally") on a seven-point scale.

3.2. PARENTAL CONFLICT AND BABIES

Stress in the infant's first year of life can influence the developing brain. When the stress is inter-parental conflict, the result can be an altered response to expressions of anger.

Graham et al (2013) showed that sleeping 6-12 month-olds in a fMRI scanner responded to an angry tone of voice more than to a neutral voice when the child came

[33] Part of the Laboratory Temperament Assessment Battery (pre-school version) (Lab-TAB).

from a household with higher non-physical inter-parental conflict (as reported by the mother). Twenty infants were played nonsense sentences spoken by a man in a very angry, mildly angry, happy, and neutral tones of voice. "Higher levels of inter-parental conflict were associated with greater activation to very angry tone of voice in the rostral ACC [anterior cingulate cortex] and sub-cortical structures including the hypothalamus. While we cannot be certain about the meaning of the activation patterns in these brain regions, many studies indicate their involvement in emotion and stress processing and regulation..." (Graham et al 2013 p786).

3.3. MATERNAL/PARENT KNOWLEDGE

Parenting knowledge includes "parents' cognitions about various approaches appropriate to fulfilling the biological and physical as well as socioemotional and cognitive needs of children as they develop; parents' understanding of normative child development, that is both developmental processes and the abilities and accomplishments of children as they grow; and parents' awareness of practices and strategies for maintaining and promoting children's health and coping effectively with children's illness" (Bornstein et al 2010).

There are issues around the reliability of parents' reports of their children's development. Recall of special events like the child's first steps tends to be quite accurate, and "parents are able to provide a quite adequate ranking of their children compared to peers, but they overestimate the competence level of their own children" (Deimann and Kastner-Koller 2011). Being interviewed in detail exaggerates the overestimation as does having a child with problem behaviour (Deimann and Kastner-Koller 2011).

Research on child maltreatment suggests that abusive parents can overestimate the child's abilities. Thus the importance of knowledge about child development. Higher knowledge is beneficial as "more knowledgeable parents are more likely to create an environment appropriate to a child's emerging abilities and promote children's healthy development" (Reich 2005 p145).

"Parents have the job of absorbing and understanding novel, complex, and rapidly changing uncertain information. At the same time they are called on to parent consistently, appropriately, and effectively. In other words, what parents need to know about parenting, children, and childhood is complicated and has real-life consequences every day" (Bornstein et al 2010).

3.3.1. Reich et al (2005)

Reich (2005) quizzed 106 low-income mothers at a paediatric clinic and 97 low-income mothers-to-be at an obstetric clinic (both at a university hospital) in the southern USA about their knowledge of child development.

The questionnaire had 39 questions (written at "2nd-grade reading level") about aspects of child development including fourteen questions on cognitive and physical development, and four on feeding and nutrition. It was presented as an attitude survey with the options "agree", "disagree", or "no opinion" for each question. This was done to reduce the perception and anxiety of tests. A correct score (%) was calculated as the number of correct responses divided by the number of items completed.

On average, overall, about two-thirds of the questions were answered correctly (65%). But this figure hid differences:

- Good knowledge on some aspects - eg: importance of establishing eating and sleeping routines (86% correct).

- Poor knowledge on other aspects - eg: how much sleep infants need (26% correct).

- Educated mothers more correct answers.

- Non-White mothers less correct answers.

Reich (2005) pointed out: "Incorrect answers on the survey tended to err on the side of overestimating infant ability, with many women endorsing abilities beyond babies' developmental capability. For example, incorrect answers tended to overestimate when babies could crawl, speak their first word, share with others, and show anxiety around strangers. On average, women overestimated development by 3 months or more" (p149).

Key strengths of study:

i) Researcher in street clothes approached the women in the waiting room. If the researcher was wearing a white coat, then it may have given the impression that the study was part of the treatment, and the women could have felt obliged to participate (ie: loss of right to non-participate).

ii) All questionnaires were completed anonymously (ie: maintain right to confidentiality) (and no payment was given).

Key weaknesses of study:

i) The study had a convenience (or opportunity) sample - ie: those women in waiting room at time of study. This sample is seen as not representative of the whole population, and so the findings should not be generalised.

ii) Choosing "no opinion" was treated as a wrong answer, but no answer at all was ignored in scoring. Thus the possibility of inflated scores, Reich admitted. She said: "Missing items were not scored to avoid falsely concluding a lack of knowledge of items that were unintentionally skipped" (p148).

3.3.2. Bornstein et al (2010)

Bornstein et al (2010) found a "fair but less than complete basic parenting knowledge" among 268 European American mothers of 20 month-olds, but this knowledge varied with mothers' age, education, use of formal parenting information (eg: books), and number of children. There was no difference based on gender of child, maternal employment status, nor birth vs adopted children.

All mothers were living with the baby's father (whether married or not), and apart from ethnic homogeneity, the sample varied on sociodemographic factors like education, age, and employment. The mothers were recruited from the eastern seaboard of the USA (eg: Maryland) via mass mailings, hospital birth information, and newspaper advertisements. Parenting knowledge was measured by the 75-item Knowledge of Infant Development Inventory (KIDI) (eg: "Most infants are ready to be toilet trained by one year of age").

The overall mean score was 81% correct (varying from 52% to 95%). The best answered items (near 100% correct) related to child health and wellbeing, safety, language abilities, and gender development, while the worst answered (less than 50% correct) included physical growth, and perception.

Bornstein et al (2010) compared their findings on the sociodemographic variables and parenting knowledge with previous research.

i) Gender of child - eg: Mondschein et al (2000) found that mothers of eleven month-olds overestimated their children's crawling ability on a downward slope if a boy and underestimated if a girl. Bornstein et al (2010) found no difference.

ii) Age of mother - Bornstein et al (2010) confirmed

that adult mothers' knowledge was better than adolescent mothers (mean: 82% vs 70% correct).

iii) Maternal employment status - Bornstein et al (2010) could not find any previous research, and their study found no difference in knowledge between women who worked full-time, part-time, or not at all.

iv) Number of children - Past studies suggested no relationship, but Bornstein et al (2010) found that the same mother scored higher on knowledge when her second child was 20 months old compared to when her first child was that age. But this finding was based on forty-five mothers only.

v) Adoptive vs birth mothers - No previous research discovered, and Bornstein et al (2010) found no difference in knowledge in a sub-sample of 28 birth mothers matched to 28 adoptive mothers.

vi) Source of parenting knowledge - Bornstein et al (2010) found that mothers who gained knowledge from written materials prior to birth and/or attended childbirth classes had the best knowledge at 20 months old (compared to non-attendance or use, and informal advice from family members).

vii) Maternal education - Bornstein et al (2010) confirmed that more educated mothers had more correct answers.

Limitations of study:

- Knowledge of parenting only measured at point in time.
- Sample not diverse in some aspects (eg: no single mothers).
- Did not explore the Internet as a source of information.

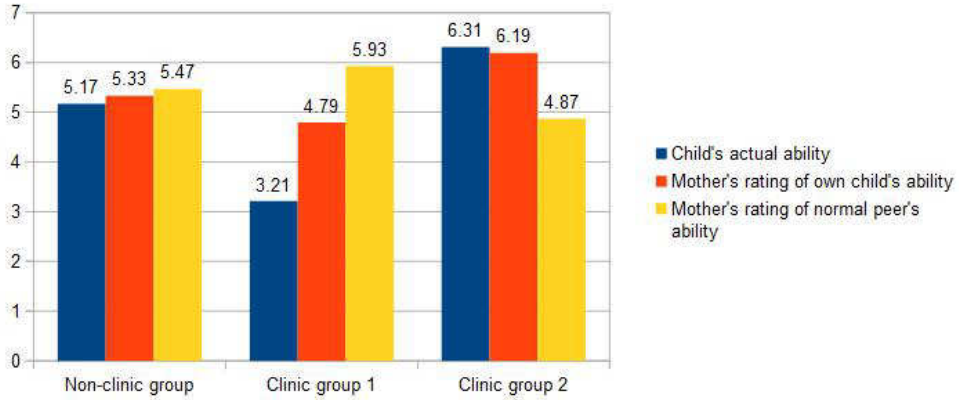
3.3.3. Deimann and Kastner-Koller (2011)

Deimann and Kastner-Koller (2011) found that mothers with concerns about their children's behaviour overestimated what a child of a certain age could achieve, and consequently expected too much of their own children.

The researchers compared thirty mother-child (3-6 years old) pairs attending two clinics in Vienna, Austria (clinic group; CG), and thirty matched pairs (non-clinic group; NG). The CG was comprised of children whose

mothers were concerned about high abilities, developmental delay, or behaviour problems. The group was sub-divided into high abilities (CG2) and other conerns (CG1). The children's development and abilities were measured by a series of tests while the mothers scored their own child and a "normal" peer on eleven scales (eg: memory, vocabulary, gross motor skills) (Wiener Entwicklunstest; WET).

"Children of the non-clinic group (NG) were normally developed and were appraised by their mothers quite accurately, who also adequately estimated a 'normal' peer's development" (Deimann and Kastner-Koller 2011 p224). In the CG, mothers with concerns about developmental delay or behaviour problems (CG1) overestimated the abilities that their children and the normal peer should have at their age. Mostly the mothers rated their children's development as average when the children were below average (figure 3.1).



(Based on Deimann and Kastner-Koller 2011 figure 4 p223)

Figure 3.1 - Mean overall WET scores.

3.4. STUDYING NON-HUMAN MOTHERS

"Mothers are made, not born. Virtually all female mammals, from rats to monkeys to humans, undergo fundamental behavioural changes during pregnancy and motherhood. What was once a largely self-directed organism devoted to its own needs and survival becomes one focused on the care and well-being of its offspring" (Kinsley and Lambert 2006 p58). These changes are controlled by hormonal fluctuations that may also alter the brain itself (permanently). For example, mother rats navigate mazes (Kinsley et al 1999), and capture prey

better [34] [35], and show less fear (Wartella et al 2003) than virgin rats, and these advantages continue after the offspring are raised (Gatewood et al 2005).

The hormonal changes work powerfully on the female brain. Again, studies of rats have shown activity in the nucleus accumbens (associated with reinforcement and reward) in lactating mothers, such that they choose their newly born pups above cocaine (Kinsley and Lambert 2006). So, these species "may care for their pups for the simple reason that it feels good to do so" (Kinsley and Lambert 2006). But what about human mothers?

Similar brain activation has been found - for example, when the baby cries - which suggests the existence of "a general maternal circuit in the mammalian brain" (Kinsley and Lambert 2006). Growth in grey matter in brains of human mothers just after given birth has also been reported (Kinsley and Meyer 2011a) [36].

If biological changes are turning a "largely self-centred organism to other-focused caregiver" (Kinsley and Meyer 2011b), what happens when the mother is not caring? In the worse cases, the mother can kill her young.

One possible biological malfunction relates to the fosB gene [37]. Brown et al (1996) genetically engineered "knockout" female mice without the activity of this gene in the brain. The result was non-nurturing mothers, and poor offspring survival. "Cues that normally elicit maternal behaviour from the mother failed to do so in the fosB knockouts and, perhaps, failed to cascade onto the otherwise receptive brain" (Kinsley and Meyer 2011b).

The fosB gene is particularly active in the pre-optic area, and reduced medial pre-optic area (mPOA) activity in the hypothalamus is associated with poor maternal behaviour [38]. Neurons in this area of the brain increase in volume as the pregnant animal gets closer to birth (Keyser-Marcus et al 2001).

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[34] For example, mother rats took an average of 50 seconds to capture a cricket in a specially designed arena compared to 270 seconds for matched virgins (Hester, Karp and Orthmeyer no date; quoted in Kinsley and Lambert 2006).

[35] Injecting oxytocin into the hippocampus of virgin female mice increased spatial memory ability, but inhibiting oxytocin (by drugs) in mothers reduced the ability (Kinsley and Meyer 2010).

[36] For example, Kim et al (2010) performed neuroimaging scans on nineteen human mothers at 2-4 weeks and 3-4 months after birth. There was an increase in grey matter volume in the prefrontal cortex, parietal lobes, and mid-brain areas. These increases were associated with positive perception of the baby as rated using a list of positive adjectives from the Yale Inventory of Parental Thoughts and Actions - Revised (YIPTA-R).

[37] Other maternally-related genes may be involved as well (Kinsley and Meyer 2011b).

[38] Experimental damage to the mPOA in maternal rats produces a reduction in caring behaviours (Kim et al 2010).

3.5. APPENDIX 3A - INSTITUTIONALISED CHILDREN

Between 1965 and 1989 the Romanian government banned contraceptives and abortions, and imposed a tax on families with less than five children. Many families were too poor to raise these children who were left in large state-run orphanages. By 1989 there were 170 000 such children (Nelson et al 2013).

The Bucharest Early Intervention Project was started in 2000 as a joint venture between the Romanian government and researchers in child development from the USA, mainly. A group of children from the orphanages who were fostered were compared to a group left in the institutions. The former group had an average IQ score ten points higher than the institutionalised children at 52 months old. The data supported the idea of a sensitive period for the development of intelligence up to two years old where emotional and intellectual stimulation is important (Nelson et al 2013).

Nelson et al (2013) also reported differences in electroencephalography (EEG) at eight years olds showing delayed brain maturation. Continuously institutionalised children (care as usual group; CAUG) and those who were placed in foster care (foster care group; FCG) after two years old showed much less activity, whereas the children placed in foster care before two years old showed little difference to the never-institutionalised group (NIG). The first two groups had severe problems in brain maturation, but the early-fostered children could "catch up" in development.

For the same sample, 52 children in the FCG, 44 in the CAUG, and 97 in the NIG, Almas et al (2012) found that NIG children had significantly higher ratings by teachers of social skills than the FCG after 20 months old and the CAUG, but not the FCG before 20 months. This latter group, in turn, had significantly higher ratings than the CAUG and the FCG after 20 months old. There was a significant negative correlation between age placed in foster care and teacher-rated social skills.

In a Turkish study, Erol et al (2010) found that adolescents (11-18 years old) reared in institutions were rated as having more social problems by caregivers and teachers than home-reared adolescents.

3.6. APPENDIX 3B - SELF-CONTROL

Moffitt et al (2013) argued that childhood self-control [39] is key to future life chances. They used data

[39] Also called resistance to temptation or delay of gratification.

from the Dunedin Multi-disciplinary Health and Development Study in New Zealand, which followed 1037 children born between April 1972 and March 1973. Self-control was measured at 3, 5, 7, 9, and 11 years old via multiple sources - observation of child's behaviour, parents, teachers, and later self-reports. Composite self-control scores were produced. For example, the lowest scorers showed characteristics like short attention span, acting before thinking, difficulty in waiting, and easily distracted.

Childhood self-control significantly predicted adult health problems, substance abuse, income and wealth, criminality, and quality of parenting of own children [40]. So, children with the lowest self-control scores were more likely as adults to have health problems, have alcohol and drug problems, be in financial difficulties, be convicted of a crime, and have lower parenting skills. Children with the highest self-control scores were the opposite.

Even among children in the same household, self-control predicted differences. For example, among same-sex fraternal (non-identical) twins, self-control at five years old predicted the likelihood of smoking at age 12 (Moffitt et al 2013).

Delay of gratification among children is usually measured by the "marshmallow test". The child can have one marshmallow (sweet, cookie, reward) now or two in a short while. How long the child can wait with the one marshmallow in front of them is measured (Mischel et al 1989). The response to this test as a pre-school child can predict self-control in later life.

Casey et al (2011) found individuals who had taken the delay of gratification task at four years old in the late 1960s and early 1970s in California, USA. Thirty-two participants were classed as the high-delay group, and they had been able to wait above the mean time for the greater reward. They also reported high self-control on questionnaires as young adults. Twenty-seven participants were the low-delay group, and as four year olds waited below the mean time for the greater reward (and self-reported low self-control).

Casey et al (2011) used a version of the Go/No Go task with the participants. One of two stimuli is presented on a computer screen, and the participants must press a button as quickly as possible (Go) or not (No Go). There were 160 trials, which included "Go" for a male face and "No Go" for a female one, and "Go" for a happy face and "No Go" for a fearful one (and vice versa).

There was no difference in accuracy of the two

[40] Based on measures at 13, 15, 18, 21, 26, 32, and 38 years old.

groups in response to the gender of the faces, but the low-delay group was significantly poorer when the happy face was "No Go" (ie: suppress response) (but not for the fearful face as "No Go"). These differences in self-control have a neurological basis (eg: differences in prefrontal cortex). Twenty-six other participants performed the Go/No Go task in a fMRI scanner.

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4. DIFFICULT CHILDHOOD

4.1. FOOD INSECURITY

Food insecurity (FI) [41] is the lack of consistent and dependable access to sufficient food for health living [42], and over 10% of homes with children in the USA (in 2009) experienced it. This figure is greater for low-income families (nearly 30%), single mothers (about 20%), and ethnic minorities (17% African Americans and 18% Hispanics) (Swindle et al 2013).

FI can lead to hunger and malnutrition, but they are not necessarily always present with FI (Blumberg et al 1999). FI tends to be divided into categories for official purposes: food insecure without hunger, food insecure with moderate hunger, and food insecure with severe hunger (Blumberg et al 1999).

The main consequences of FI for children are upon their development. Early FI (ie: before 5 years of age) has been found to predict lower mathematics and reading scores in middle childhood as well as poor classroom behaviour, and overweight and obesity in adolescence and adulthood (Swindle et al 2013).

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[41] FI is one aspect of poverty and well-being. UNICEF (2007) used six dimensions to assess overall child well-being - material well-being, health and safety, educational well-being, family and peer relationships, behaviours and risks, and subjective well-being. The Netherlands scored highest among 30 rich countries followed by other northern European countries, though surprisingly the UK (and the USA) were low in the rankings. There was no clear relationship between child well-being and GDP per capita.

[42] An "official" definition used in the USA is "whenever the availability of nutritionally adequate and safe foods or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain... [and] without resorting to emergency food supplies, scavenging, stealing, and other coping strategies" (Life Sciences Research Office 1990 quoted in Blumberg et al 1999 p1231).

Belsky et al (2010) showed that the effect of FI also worked indirectly through poor parenting behaviours as parents lacking food are more likely to be depressed and anxious (and thus less likely to provide optimal parenting behaviours).

This study used the 1116 families with twins in England and Wales from the Environmental Risk Longitudinal Twin Study (E-Risk) which tracks these children since birth in 1994-5. The children were five years old at the start of this study and 12 years old at the end. The children in households with FI were 278 (12.5% of sample). These children had significantly lower IQ scores and higher levels of behavioural and emotional problems than the other children at 12 years old.

After accounting for differences in home environment (eg: mother's personality, sensitivity to child's needs, household income), Belsky et al (2010) found that children reared in households with FI had more emotional problems at school age (but not cognitive and behavioural problems).

Belsky et al (2010) concluded that "although exposure to food insecurity appears to make some contribution to children's emotional distress, primarily other features of children's households explained differences in cognitive, behavioural, and emotional problems between food-insecure children and their peers in this study. Specifically, children who experience food insecurity are cared for by mothers with poor self-control and depressive and antisocial tendencies (low conscientiousness, high neuroticism, and low agreeableness), and they live in households providing less structure and nurturance. These characteristics of mothers and the household environments they provide appear to function as risk factors for both food insecurity and cognitive and mental health problems among children, above and beyond the general risk imposed by poverty" (p813).

Belsky et al (2010) used a nationally representative sample in their longitudinal study with a low drop-out (96% participated at 12 years old). FI was reported by mothers and the children's behaviour by self-report or teacher-rating. But it was only twins, and no details were collected about the fathers.

FI is part of multiple disadvantage. FI is more often experienced by the youngest parents, with less educational qualifications; parents who move frequently and/or experience homelessness; experience domestic violence; and have disabled family members (Swindle et al 2013).

Children from low-income food-insecure families have higher rates of chronic illness than low-income food-secure families by age four years (Swindle et al 2013). Some of this difference may be related to the fact that

children in FI eat more processed foods (ie: high-fat and high-sugar) and less fresh fruit and vegetables than in food secure families (Swindle et al 2013).

Help can be provided to families with FI if they can be identified, but such families are less likely to receive healthcare (and to be assessed by medical professionals). Children being underweight or from low-income families are not necessarily accurate measures of nutrition. Thus the development of questionnaires to be more accurate. For example, the Household Food Security Survey (HFSSM) (Blumberg et al 1999) is a self-administered short survey (originally 10 items, but also shorter versions; table 4.1).

- In the last 12 months, did you ever cut the size of your meals or skip meals because there wasn't enough money for food? (If yes, how often - almost every month, some months but not every month, or in only 1 or 2 months)?
- In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money to buy food?
- In the last 12 months, were you ever hungry but didn't eat because you couldn't afford enough food?
- "The food that you bought just didn't last, and you didn't have money to get more". Was that often, sometimes, or never true in the last 12 months?
- "I couldn't afford to eat balanced meals". Was that often, sometimes, or never true in the last 12 months?

(Based on Blumberg et al 1999 table 2 p1233)

Table 4.1 - Shorter version of HFSSM.

Hager et al (2010) tested the validity of a two-item HFSSM [43] - "Within the past twelve months, the food we bought just didn't last, and we didn't have money to get more", and "Within the past twelve months, we worried whether our food would run out before we would get more". Used by over 30 000 health uninsured families with children under two years old in the USA [44], this short version of the HFSSM had a sensitivity of 97% (correct identification of food insecure families [45]) and specificity of 83% (correct identification of food secure

[43] This was based on a comparison with the 18-item HFSSM, where three or more yes responses is FI.
[44] Overall, 23% of 30 098 families from seven urban medical centres (Baltimore, Boston, Little Rock, Los Angeles, Minneapolis, Philadelphia, and Washington DC) class as experiencing FI (Hager et al 2010).
[45] Both the short and long version agreed on FI of 97%, but the longer version rated the other 3% as food insecure but the two questions did not.

families [46]) [47] [48]. The scores were correlated with child health and weight [49].

Swindle et al (2013) made two key criticisms of this study. the sample was recruited from families visiting Emergency Rooms (Accident and Emergency units) in cities (ie: no rural participants), and the two questions were asked by an unfamiliar interviewer (ie: risk of false answer).

Swindle et al (2013) assessed the validity of two questions to establish FI, but included them in a general interview about the child's family life (Early Childhood Family Map Inventory; EC-FM). The questions were:

- "Within the past twelve months, the food we bought just didn't last, and we didn't have money to get more" (same as Hager et al 2010).

- "Within the past twelve months, you or others in your household cut the size of your meals or skipped meals because there wasn't enough money for food".

A total of 1050 caregivers (mostly mothers) from families in a southern US state were interviewed [50]. The families were enrolled in "Head Start", which is a government-funded programme for low-income households (on or below the poverty line), and the children were aged 3-5 years old.

A "yes" response to either FI question was classed as FI (n = 175; 17% of sample). The sensitivity of the two items was 78.6% and the specificity was 97.4%. This was established by comparing the responses of 53 families to the EC-FM questions with a six-item version of the HFSSM (which was used as the correct measure). There was a small amount of disagreement as the EC-FM rated three families as food insecure that the HFSS did not, and one family the other way around. Thus, fourteen families were in FI by the EC-FM questions and twelve by the HFSSM (figure 4.1).

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[46] Both questionnaires agreed that 83% were not in FI, while the longer version rated other 17% likewise and the two questions did not.

[47] Blumberg et al (1999) reported a sensitivity for overall FI of 92% for the short form of the HFSSM, and a specificity of 99.4%, but these figures varied for households with children (85.9% and 99.5% respectively) and without children (99.7% and 99.3% respectively), and all households FI with hunger (84.7% and 99.6% respectively). This was based on a sample of over 44 000 US households in 1995.

[48] Blader and Carlson (2007) felt that "Mis-specification of who has a disease (low specificity) is generally more damaging to scientific inference than under-detection (low sensitivity)".

[49] For example, food-insecure children had an adjusted odds ratio of 1.56 for fair or poor health than food-secure children (Hager et al 2010).

[50] Probably Arkansas as the researchers were based at the University of Arkansas for Medical Sciences in Little Rock.

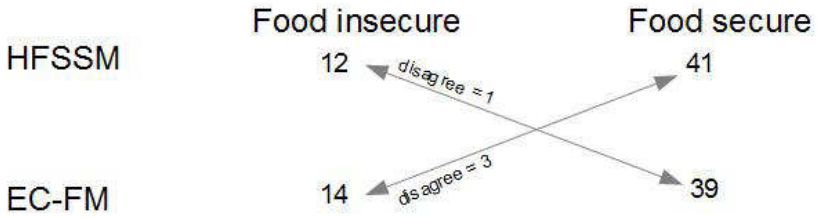
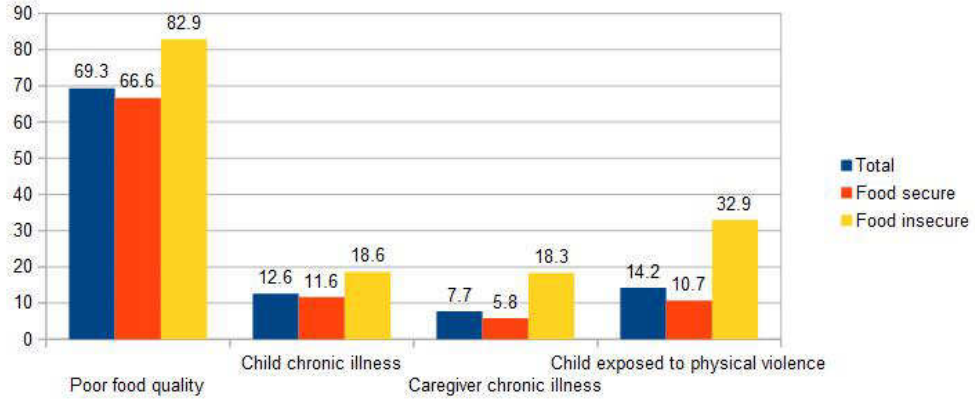


Figure 4.1 - Rating of FI and security by EC-FM and HFSSM.

The FI group were significantly more likely to be Hispanic than in food secure group (31.2% vs 18.5%), and less likely to be African-American (43.9% vs 56.8). There was no difference between food secure and insecure groups for variables like geographical location (urban/rural), level of education, or number of children in household.

Families in FI had significantly poorer food quality (eg: less likely to have recommended amount of fruit and vegetables); significantly more chronic illness among the child, and caregiver, but less likely to use healthcare services; more exposure of the children to physical violence and other safety risks in the home and neighbourhood (figure 4.2).



(Data from Swindle et al 2013 table 3 p937)

Figure 4.2 - Percentage of families and selected behaviours where significant difference between groups.

Evaluation of Swindle et al (2013)

1. Sample - Wider range (eg: urban and rural participants), but smaller than other studies. Use individuals enrolled in "Head Start" (ie: already found by government authorities), but is it comprehensive (ie: all low income families). Thus, it is an opportunity sample.

2. Interviewer - Known to parents (home visitor or teacher), and it is hoped that this will encourage more honest answers than to a stranger about FI. But what causes more embarrassment (and the possibility of lying), admitting to a stranger or a known person about FI?

3. Interview - The two FI questions were part of one-hour long interview than involved twelve sets of questions about the family and home environment of the child. In total there were 101 items. The purpose of the FI questions is hidden, but a long interview risks tiredness and loss of interest by the interviewee. The researchers admitted that the stand-alone validity of the FI questions was not established.

4. Response options - Respondents had the choice of "yes" or "no", which was quite limiting. No details were collected of how often FI was a concern or the degree to which individuals skipped meals, for example.

5. FI questions.

a) "Within the past twelve months, the food we bought just didn't last, and we didn't have money to get more" - A "yes" answer could be because individuals ate too much rather than the assumed lack of food. In fact, the question is asking two things at once: shortage of food, and lack of food. They do together, but not necessarily. It may have been better to ask the question in two parts: food not lasting, then yes answer leads to supplementary question about lack of money.

b) "Within the past twelve months, you or others in your household cut the size of your meals or skipped meals because there wasn't enough money for food" - It is possible that the family did not have enough money because they were buying other things. Thus FI could occur in rich families who spend money inappropriate. In one sense, this is FI, whereas the concept of FI assumes low income.

4.2. CHILD MALTREATMENT AND INFLAMMATION

Prolonged stress in childhood as in experiences of maltreatment alters the stress response in later life [51],

[51] Nanni et al's (2012) meta-analysis found that child maltreatment was associated with a greater risk of recurrent and persistent depression as an adult, and less response to treatment for it than individuals not maltreated as children.

In terms of the risk of depression, sixteen epidemiological studies (with over 23 000 participants) were found, and the overall odds ratio was 2.27 (ie: over twice as likely to suffer from depression as adult if experienced child maltreatment).

and subsequently the immune system, in particular inflammation-related diseases (eg: cardiovascular disease; chronic lung disease) (Danese et al 2007) [52].

Danese et al (2007) tested three alternative hypotheses for the link between child maltreatment and adult inflammation:

i) Co-occurring risk hypothesis - Maltreated children experience other early life risks (eg: low birth weight; socio-economic disadvantage) that account for adult inflammation.

ii) Adult stress hypothesis - Maltreated children experience more stress as adults and this explains the inflammation.

iii) Health-behaviour hypothesis - Maltreated children engage in more unhealthy behaviours (eg: smoking; poor diet) as adults and this is the reason for the inflammation.

The researchers used data from the Dunedin Multidisciplinary Health and Development Study in New Zealand, which follows a birth cohort from April 1972-March 1973. The current study was based on 972 of the 1015 study members aged 32 in 2004-5. Child maltreatment

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There were differences between the studies found by Nanni et al (2012) and methodological issues including:
i) Sample studied - eg: general population or clinical.
ii) Measure of child maltreatment - eg: adult recall.
iii) Measure of depression - eg: semi-structured interview or self-reported questionnaire.
iv) Type of child maltreatment - eg: physical abuse or family violence.
v) Length of study - eg: 1 or 40 years.
vi) Gender - eg: 50% or 100% female.
vii) Definition of "persistent" - eg: most days over two years or daily for twelve months.
viii) Definition of "recurrent" - eg: 2 or 3 episodes in lifetime.
ix) Size of sample - eg: <100 or >5000.
x) Use of own designed questionnaire or psychometrically established one.

[52] A prolonged early life stress reaction alters glucocorticoids, which leads to unrestrained adult inflammation, for example (Danese et al 2007).

included maternal rejection, harsh discipline, physical and/or sexual abuse, and frequent change of caregivers [53]. These were based on retrospective reports mostly. The "definite" (child maltreatment) group had 83 members.

Adults in this group have higher levels of high sensitivity C-reactive protein (hsCRP), which is a marker for inflammation and a risk factor for cardiovascular disease, than non-maltreated children. After controlling for other variables, child maltreatment independently predicted adult inflammation. None of the three alternative hypotheses was entirely supported, even though maltreated children did experience more stressors as children and adults, and did engage in more health-damaging behaviours.

This study is quasi-experimental [54] because an experimental design is not possible ethically (ie: randomly assigning children to maltreatment or not at birth). Only the experimental design can establish causality, but the quasi-experimental method here "meet several criteria suggestive of a causal association between childhood maltreatment and adult inflammation" (Danese et al 2007 p1321).

4.3. INTERGENERATIONAL TRANSMISSION OF CHILD ABUSE

Some children who experience abuse or maltreatment becomes abusers themselves as adults. This is the intergenerational transmission of child abuse. But how many victims become perpetrators later? There are ten key methodological issues for studies that seek to answer this question (Ertem et al 2000) (figure 4.3):

1. How to define abuse?

2. Recruitment of control group which has not experienced abuse.

3. What to use as outcome measure (eg: abuse of own child or stranger's)?

4. Control of confounding variables, like socio-economic status or one/two-parent families.

5. Measuring abuse as child - eg: adult recall (risk

[53] Child maltreatment is often a combination of adverse childhood experiences (ACEs). For example, Dong et al (2004) found that the presence of one ACE significantly increased the risk of others including different types of abuse and neglect, living with domestic violence and substance abuse. Of individuals who had experienced child physical abuse, say, 83% reported another ACE as well, while 20% had five or more different ACEs. For physical neglect sufferers, 89% had another ACE and 37% five or more such events. This study was based on data from San Diego, California, USA.

[54] Eg: no random allocation of participants to condition.

of memory bias), cases reported to authorities (risk of missing unreported cases), or mother's report.

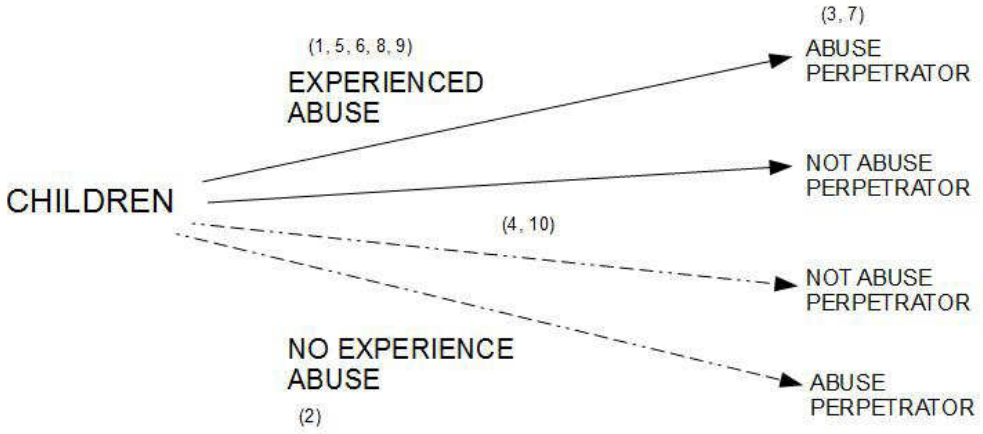
6. Who commits the abuse - eg: by biological father or other family member.

7. Length of follow-up into adulthood.

8. Type of abuse experienced.

9. Age and length of abuse experience.

10. Type of study - eg: longitudinal or cross-sectional.



(Numbers related to methodological issues above)

Figure 4.3 - Ideal design for study.

4.4. SCHOOL BULLYING

School bullying is simply defined as "intentional and repeated aggression towards weaker peers" (Sapouna et al 2010). Between 20-40% of youths report bullying victimisation (or peer maltreatment), with 3-8% frequent victims (Benjet et al 2010). The World Health Organisation (WHO) in 2009-10 calculated that about one-third of children were bullied based on a study of 38 countries/regions (Lereya et al 2013).

There is a strong relationship between bullying victimisation and depression (Hawker and Boulton 2000). It seems that there is a causal relationship. For example, identical twins bullied between 7-9 years old reported more depression-like symptoms than non-bulled twins at ten years old (Arseneault et al 2008).

But there may be a mediating variable - ie: a

genetic vulnerability in the form of short versions of a serotonin transporter gene (5-HTTLPR). Having one or two short versions is associated with depression in response to negative life events more than carriers of two long versions (Caspi et al 2003) (appendix 4A).

Benjet et al (2010) found that 10-14 year-old females who had two short versions of the gene and experienced relationship bullying were more likely to show depressive symptoms than other females. The 78 North American participants were divided into three groups based on 5-HTTLPR - long/long, short/long, and short/short - and self-reported victimisation or not (eg: score of 3 or more out of 5 to questions like "How often does a classmate tell rumours or lies about you to try to make other students not like you anymore?"). Participants who had been victims with the short/short version of the gene had a mean depression score of six, which is significantly higher than short/short non-victims, and other versions of the gene (eg: long/long and victim had mean score of less than 2).

4.4.1. Treatment

One strategy to reduce victimisation by bullies is to improve the coping skills of victims, which is often poor (Sapouna et al 2010).

Sapouna et al (2010) reported the short-term benefits of a virtual reality programme called "FearNot!" (Fun with Empathetic Agents to achieve Normal Outcomes in Teaching) [55] to help victims of bullying. One thousand, one hundred and twenty-nine 7-11 year-olds in 27 schools in England and Germany were recruited. Classes were randomly allocated to receive the intervention or to a waiting control group in this randomised controlled trial.

A baseline measure of bullying victimisation was made (T0) before three weekly 30-minute sessions of "FearNot!". Then measures were taken one (T1) and four weeks later (T2). "FearNot!" used 3D animated pupils involved in scenarios of bullying, and the viewers interacted with the victims about ways of coping.

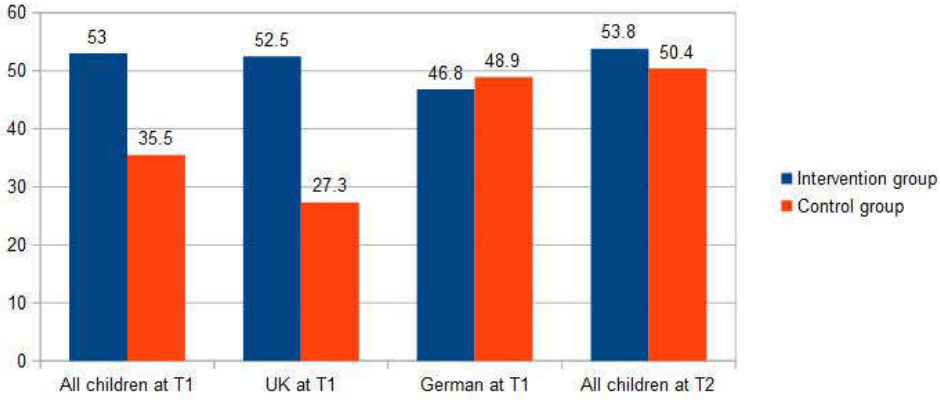
Bullying was measured by two questions. The first was about direct victimisation in the past month including being hit/beaten up, having things stolen, being threatened/blackmailed, being called nasty names, or having nasty tricks played on them. The other question asked about relational victimisation - how often left out of games, children not wanting to be their friends anymore, or having nasty lies or rumours spread about

[55] Details at http://www.e-circus.org/.

them. The choice of responses in both cases were "never" (0), "1-2 times" (1), "more than 4 times" (2), and "at least once a week" (3). Children who scored 2 or 3 on either question at T0 were categorised as "victims" (n = 230). These children who scored 0 at T1 or T2 were categorised as "escaped victims".

Children in the intervention group were significantly more likely to move from "victim" to "escaped victim" at T1 than in the control group (53% vs 35.5%), but not at T2 (figure 4.4). the researchers admitted the need for booster sessions of the programme to maintain the benefits in the longer term.

The measures of bullying were self-reported by the children with no independent verification of the frequency of bullying. However, the reported rates were similar to other studies (eg: Wolke et al 2001) [56].



(Data from Sapouna et al 2010 table 2 p109)

Figure 4.4 - Percentage of children moving from "victim" at T0 to "escaped victim".

4.4.2. Effects of Bullying

Severe, long-term experiences of school bullying lead to psychological problems like anxiety and depression, and low self-esteem, as well as altering the physiological response to future general stress (Hamilton et al 2008).

In animal studies, socially defeated individuals (ie: equivalent to bullying victimisation) show an altered hypothalamic-pituitary-adrenal (HPA) axis response, and increased heart rate to stress (eg:

[56] Wolke et al (2001) reported 24% of 6-8 year-olds in England vs 25-26% any victimisation in this study.

rodents; Martinez et al 1998).

Hamilton et al (2008) recruited undergraduates at a US university, and based on their reports of bullying in the early teen years [57], they were divided into "Bullied" (n = 54) and "Non-bullied" (n = 39) for the experimental stressor. The stressor was the belief that the participant would have to give an evaluated public speech in about thirty minutes time. Physiological measures (blood pressure and saliva sample [58]) were taken before the stressor was revealed (T1 - pre-stress), 25 minutes after the stressor introduced (T2 - stress), and then 30 minutes after the participants had been told that the speech not taking place (T3 - post-stress).

The "Bullied" male participants only showed a blunted blood pressure response (ie: no increase at T2) to the stressor compared to "Non-bullied" men, otherwise there were no differences between the groups (bullied/non-bullied, male/female). The lack of difference, particularly between women, was unexpected (based on previous research).

4.4.3. Parenting and Bullying

Negative parenting behaviour (eg: high levels of hostility towards the child, hitting and shouting at them) before school-entry age is associated with the child becoming a victim of school bullying or a bully/victim (ie: both bully and victim). Lereya et al (2013) stated: "Abuse and neglect and maladaptive parenting were the best predictors of victim or bully/victim status at school. Furthermore, high parental involvement and support, and warm and affectionate relationships were most likely to protect children and adolescents against peer victimisation followed by good family communication and supervision. However, protection by positive parenting for becoming a victim of peer bullying was small and at best moderate for bully/victims" (p1102).

Lereya et al (2013) summarised the nature of the relationship between negative parenting and bullying:

> Certain characteristics of the victimised children may make them more likely to be targets of other forms of assault. For example, some maltreated and abused children may adopt a submissive and ingratiating posture with their parents in an effort to maintain their

[57] This was based on responses on the Experiences with Bullying Questionnaire (EBQ),which has 21 items about physical, verbal, and emotional bullying that are rated on a five-point scale (from "never" to "very frequently").

[58] The saliva sample is used to ascertain cortisol level which is a measure of the HPA axis response.

> safety in violent and/or chaotic homes... Moreover, children who are exposed to negative parenting may learn that they are powerless, have less confidence and become less able to assert their needs...; they may generalise such behaviour to extra familial interactions; and peers may regard them as easy targets for bullying... On the other hand, some maltreated children display heightened levels of aggression... and antisocial acts..., which suggests that they may be more inclined toward bullying behaviour (p1103).

Lereya et al (2013) drew their conclusions from a meta-analysis of seventy studies from 1970 to 2012. They noted some reservations, however:

i) Most studies did not establish cause and effect. So, negative parenting could lead to bullying at school, or a bullied child may be difficult leading to negative parenting.

ii) Only studies published in English were included.

iii) Little distinction made between physical and relational bullying.

iv) Different measures of parenting behaviour used.

v) Different studies used different source of information (eg: child self-reported bullying their parents' behaviour vs parents self-reported their behaviour).

4.5. DOMESTIC ABUSE

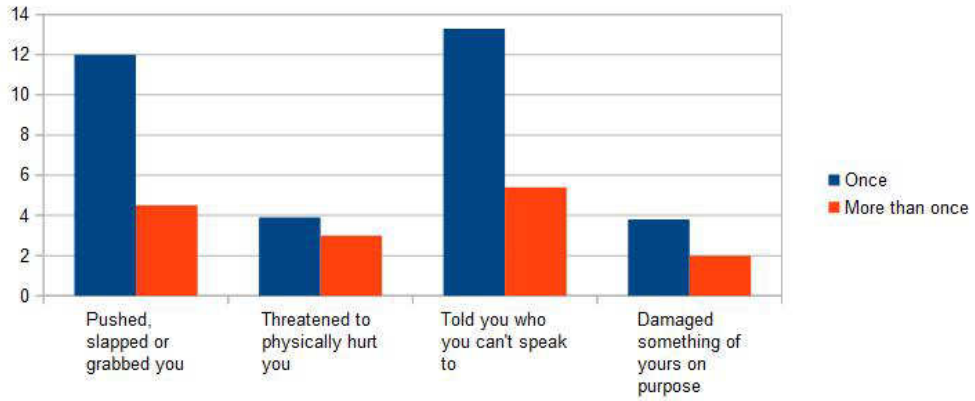
Gadd et al (2012) reported the attitudes towards and experiences of domestic abuse from the "From Boys To Men" project [59]. Overall, 44% of males and 46% of females who had been on a date reported experiencing at least one of ten types of domestic abuse from past or current boy/girlfriends (eg: "ever told you who you can't speak to"; "ever pushed, slapped or grabbed you") (figure 4.5).

A quarter of both males and females admitted to being perpetrators of domestic abuse.

In terms of witnessing domestic abuse, 30% of males and 39% of females reported at least one of the types involving adults who looked after them.

The participants were also presented with twelve scenarios, and asked if it was acceptable to hit the partner in such a situation - 49% of males and 33% of

[59] This research project is based around 1143 13-14 year-olds in North Staffordshire, England.



(Data from Gadd et al 2012 table p8)

Figure 4.5 - Percentages of respondents reporting selected forms of domestic abuse from girl/boyfriend.

females thought it was acceptable in at least one of the scenarios (eg: if person hit them first; if cheated on partner) (figure 4.6).

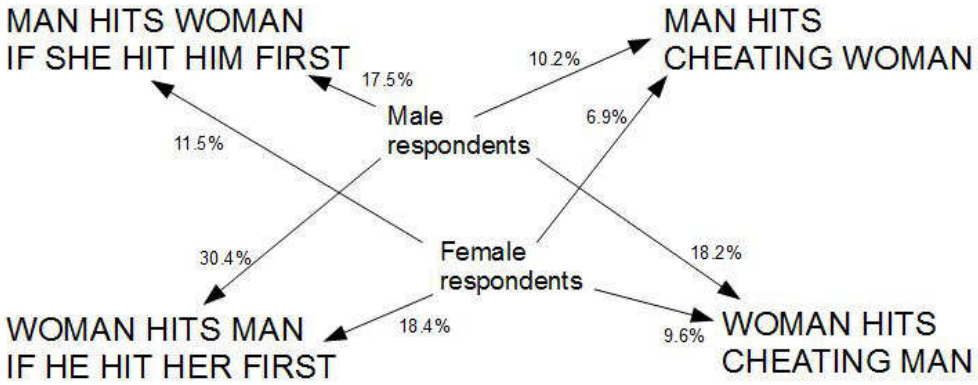


Figure 4.6 - Gender differences on when acceptable to hit partner in two situations.

Gadd et al (2012) observed: "What this tells us is that less boys than girls regard hitting your partner as wrong, or as synonymous with 'real' violence. Perhaps more boys see hitting as something that just happens in their own relationships and in those of their parents? Certainly, the circumstances in which hitting is regarded as most justifiable are fairly commonplace ones, likely to arise, unfortunately, in many young people's early dating relationships. In short, boys tend, firstly, to perceive less violence at home, and secondly to perceive more of what they do see as acceptable in certain

relatively commonplace circumstances" (pp9-10) [60].

4.6. FAMILY TYPE AND DELINQUENT BEHAVIOUR

It has been observed from studies that adolescents in a single parent family or post-divorce step-family are more likely to show delinquent behaviour, and have substance use than from intact (two-parent) families (Vanassche et al 2013). These behaviours are classed as externalising behaviours (as opposed to internalising behaviours like depression).

A simple correlation between family structure/type [61] and adolescent problems, though having support from research, is criticised for not clearly specifying how one causes the other. This has led to interest in the nature of mediating variables within family structures (Vanassche et al 2013).

The relationship between externalising behaviour and family type is mediated by three key variables (Vanassche et al 2013):

a) Parental conflict - detrimental to children in whatever family type.

b) Quality of parent-child relationship - eg: post-divorce with the residential biological parent and the non-residential one, and the presence of a new stepfamily. Also gender differences in relationships (eg: father/daughter vs mother/daughter).

c) Parental role model - eg: alcohol consumption by parent and adolescent.

Vanassche et al (2013) proposed a model and hypotheses to test these variables in relation to alcohol consumption and delinquency (figure 4.7).

The researchers used data from the second round of the Leuvan Adolescents and Families Study (LAGO) in northern Belgium in 2010 with 1619 12-18 year-olds. Family type were categorised as "classical two-parent" (married or co-habiting), single parent, or stepfamily.

Delinquent behaviour was self-reported from "never" (1) to "four times or more" (4) for the last year on eleven behaviours (eg: "stole a bike or moped"; "carried a weapon"; "got involved in a fight") [62]. Individuals with

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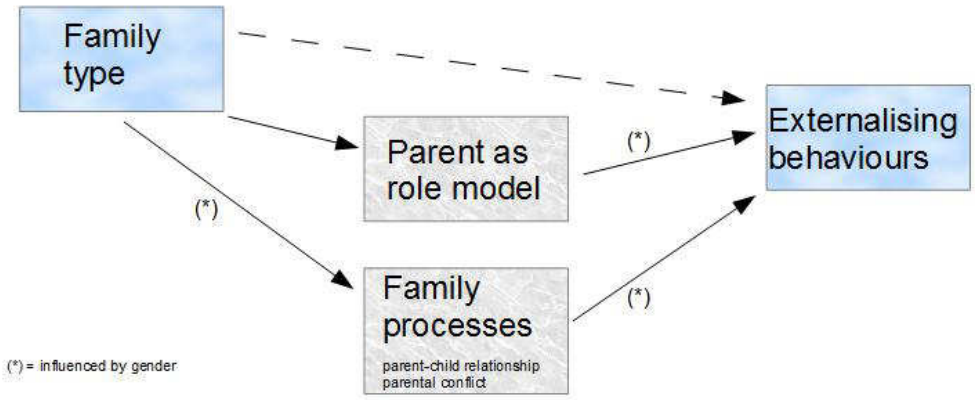
[60] "Interestingly, those who had experienced domestic abuse – whether as victims, witnesses or perpetrators – were more likely to think that violence was acceptable than those who had not" (Gadd et al 2012 p10).

[61] There is much debate about the importance of family structure/type versus neighbourhood on behaviour (appendix 4B).

[62] This list was developed by Baerveldt et al (2003).

a score of 15 or more were categorised as "frequent delinquency" and scores of eleven (minimum) were classed



(Based on Vanassche et al 2013 figure 1)

Figure 4.7 - Model of relationship between family type and externalising behaviour proposed by Vanassche et al (2013).

as "no delinquency". Inbetween scores were called "sometimes delinquency".

Alcohol use was rated for the past six months from "never" (1) to "daily" (5) with scores of 4 or 5 classed as "frequent consumers", and 1 or 2 as "no or light consumers". These are the two dependent variables.

The mediating variables were rated by the adolescents using an established questionnaires for parent-child relationships (Network of Relationship Inventory scale (NRI); Furman and Buhrmester 1985) [63], and parental conflict (Conflict Awareness Scale; Grych and Fincham 1993) [64], and an estimation of alcohol use for each parent (using same scale as for themselves). This was the measure of parental role model.

Four sets of hypotheses were proposed by the researchers:

i) Type of family and externalising behaviours.

a) Adolescents in non-intact families (one-parent and step) will have higher levels of externalising

[63] This has nine items (eg: "Does your mother/father respect you?"; Do you share personal feelings with your mother/father?") rated on a five-point scale (0-4). A higher score (maximum 36) was classed as a positive relationship with parents.

[64] The respondents were to rate the frequency (from "never" (1) to "always" (5)) of arguments by biological parents over five areas (eg: money; children's education). A higher score was more conflict.

behaviours (delinquency and alcohol use) than in intact (two-parent) families - This was supported as adolescents from non-intact families were significantly more likely to be categorised as "frequent delinquency", and to be "frequent consumers" of alcohol (particularly in the latter case between 11-15 years old - ie: before legal at 16 years old).

b) Girls in stepfamilies will have more externalising behaviours than girls in single parent families - Supported by data (figure 4.8).

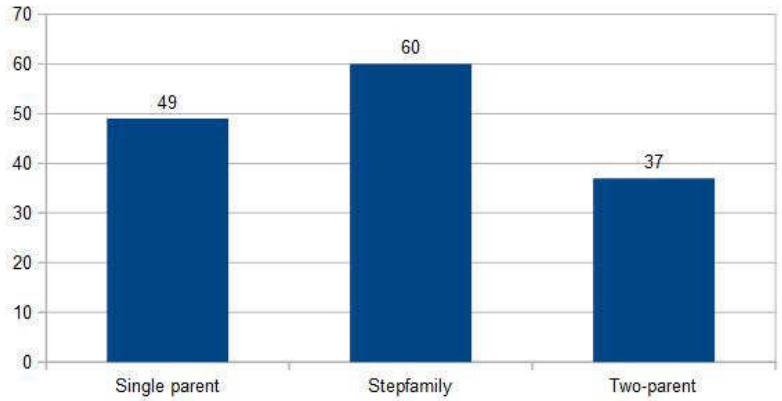


Figure 4.8 - Percentage of girls classed as sometimes or frequent delinquency based on family type.

c) Boys in single parent families will have more externalising behaviours than boys in stepfamilies - Supported by the data (figure 4.9).

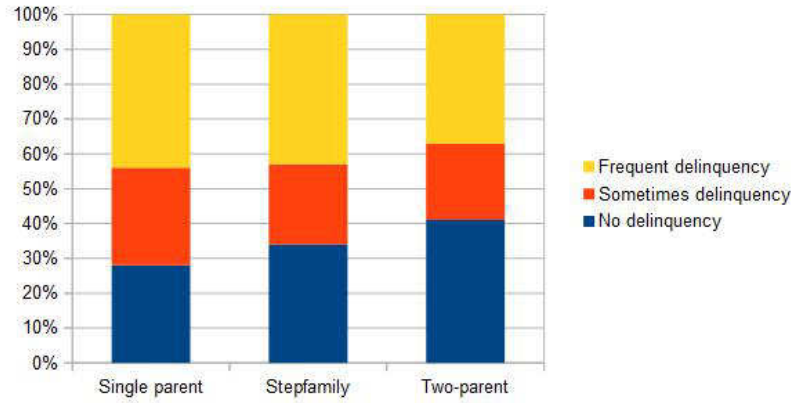


Figure 4.9 - Percentage of boys and delinquency based on family type.

d) There will be a stronger association between

family type and alcohol use than family type and delinquency for girls - Not supported by data.

e) There will be a stronger association between family type and delinquency than family type and alcohol use for boys - Not supported by data.

ii) Relationship with parents.

a) Children reporting a good relationship with their biological parent(s) will have less externalising behaviours than children with a poor relationship - Not supported for alcohol use for either sex, but supported for girls and delinquency.

b) The quality of relationship with the same-sex biological parent will have a greater impact on externalising behaviours than the relationship with the opposite-sex parent - This was supported as a good relationship with the same-sex parent was negatively associated with delinquent behaviours (irrelevant of family type), especially for boys.

iii) More frequently reported parental conflict will be associated with "frequent delinquency" and more alcohol use - Supported for boys and delinquency only.

iv) Alcohol consumption by biological parent(s).

a) More frequent alcohol consumption by parent(s) will be associated with more externalising behaviours - Higher alcohol use by the father was associated with more delinquency for both sexes, while alcohol drinking role models had alcohol drinking children.

b) The alcohol consumption of the same-sex biological parent will be a greater impact on externalising behaviours than the opposite-sex parent - Supported for girls and delinquency, and both sexes and alcohol use.

To summarise, the following significant associations were found (figure 4.10):

- Boys and delinquency - single parent family; frequent parental conflict; frequent alcohol use by father; poor relationship with parents.
- Girls and delinquency - stepfamily; frequent alcohol use by either parent; poor relationship with parents, especially mother.

- Boys and "frequent consumers" of alcohol before age 16 - stepfamily; frequent alcohol use by father.

- Girls and "frequent consumers" of alcohol before age 16 - single parent family; frequent parental conflict; frequent alcohol use by mother.

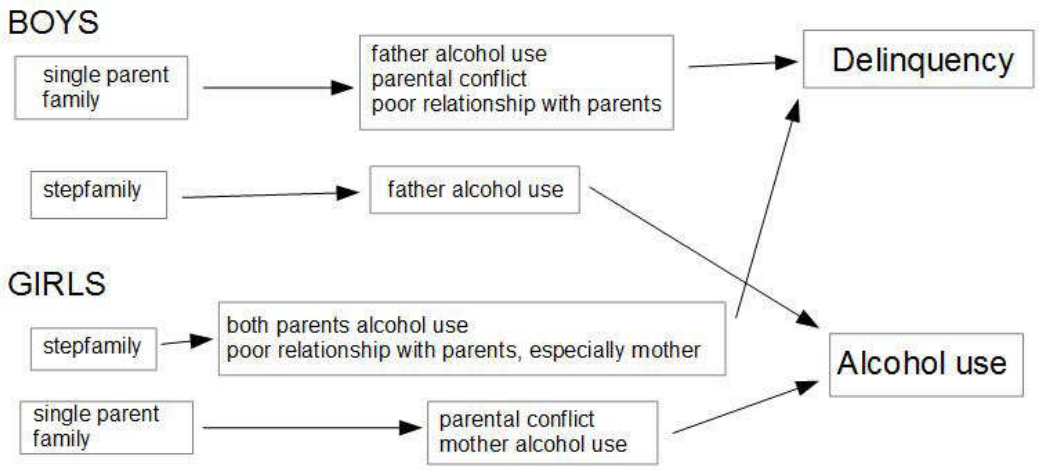


Figure 4.10 - Significant associations with externalising behaviours.

The researchers felt that, overall, the family type and parental role model were the most important factors in predicting externalising behaviours by the adolescents.

Though this study had a large sample from a wide cross-section of Belgian society, along with clear numerical criteria for scoring the variables, there were weaknesses:

- No details of post-divorce differences included (eg: sex of residential parent).

- No account taken of difference between divorce and dissolution of co-habitation.

- The categories of family types was limited, particularly the simple distinction between one- and two-parent families (Jenkins and Zunguze 1998).

- The data were cross-sectional (ie: collected at one point in time), and this limits the ability to establish causation between the variables.

- The data were self-reports with no independent verification. Vanassche et al (2013) admitted:

"Obviously the adolescent perspective we capture is not necessarily the reality as experienced by the parents themselves. This raises a fundamental issue regarding differences between factual behaviour, reported behaviour and perceived behaviour".

- Only students attending schools on days of study were included (eg: most delinquent adolescents more likely to not be there?).

- The data collected were quantitative, and the emphasis was upon the general patterns rather than the individual differences.

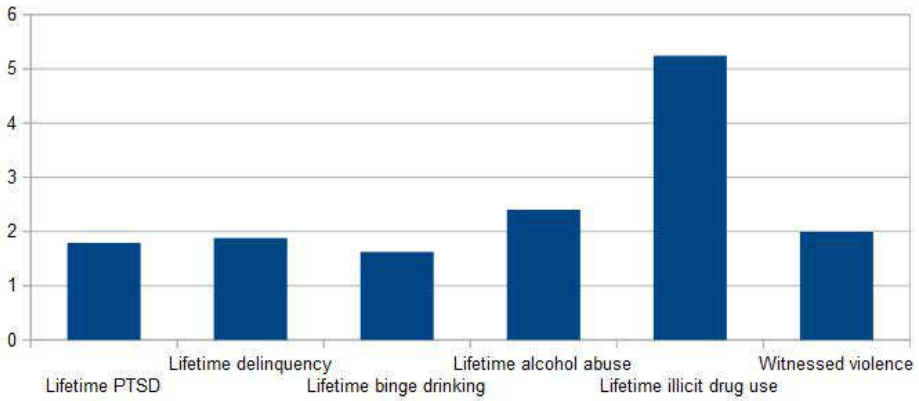
4.7. PREDICTING PROBLEMS

The ability to predict the development of childhood problems, especially delinquent behaviour, into adolescence and adulthood is highly desirable. It requires the longitudinal method to do so. For example, the Twin Study of Child and Adolescent Development (TCHAD) of all 1480 twin pairs born in Sweden between May 1985 and December 1986 (Lichtenstein et al 2007). By 2005 the twins were 19-20 years old.

Using this data, Forsman et al (2010) found that psychopathy (eg: callous; manipulative) in adolescence predicted anti-social behaviour (eg: rule-breaking; aggression) as young adults, but not the other way around. However, comparing age 8-9 with 16-17 years old presented a bidirectional relationship.

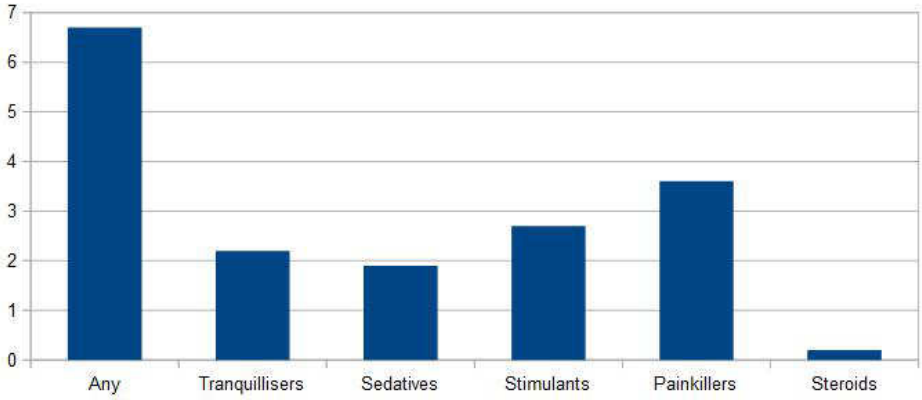
In terms of substance abuse, the National Survey of Adolescents-Replication (NAS-R) found that the risk factors for non-medical use of prescription drugs (NMUPD) [65] were delinquent behaviour, other drug use, having witnessed violence (in home or community), and experienced post-traumatic stress symptoms (figure 4.11) (McCauley et al 2010). This study was based on 3614 non-institutionalised, civilian, English-speaking 12-17 year-olds in the USA contacted by telephone. For the last year, participants were asked about tranquillisers (eg: Valium), sedatives (eg: barbituates), stimulants (eg: Ritalin), steroids, and painkillers. Overall, 6.7% of the sample admitted to NMUPD (figure 4.12) [66].

[65] NMUPD is officially defined as "using a psychotherapeutic drug, even once, that was not prescribed for you, or that you took for only the experience or feeling it caused" (quoted in McCauley et al 2010).
[66] This is slightly lower than other US studies which give estimates of 10% of 12-17 year-olds, and this figure is a large increase in recent years. It puts NMUPD as second to marijuana use in that age group (McCauley et al 2010).



(Data from McCauley et al 2010 table 3 p89)

Figure 4.11 - Significant odds ratios for NMUPD.



(Data from McCauley et al 2010 table 2 p88)

Figure 4.12 - Percentage of adolescents reporting NMUPD in past year.

The Millennium Cohort Study (MCS) is based upon around 19 000 births in the UK between 1st September 2000 and 31st August 2001 in England and Wales, and 1st December 2000 to 30th November 2001 in Scotland and Northern Ireland [67]. The first set of data was collected at nine months old (sweep 1), and then at three years old (sweep 2), 5-6 years old (2006 - sweep 3), in 2008 (sweep 4), and 2012 (sweep 5).

Using sweep 2 data, Flouri et al (2010) focused on a sample of 9630 children in 6052 families in different

[67] Updated details at http://www.cls.ioe.ac.uk/page.aspx?&sitesectionid=851&sitesectiontitle=Welcome+to+the+Millennium+Cohort+Study.

areas (eg: England-advantaged vs England-disadvantaged based on factors like income, employment, and crime). The children's emotional and behavioural problems based on caregiver reports was used as the outcome measure. Cumulative risk factors were found to predict such problems. These risk factors included eight adverse family stressors (eg: negative change to parents' financial situation; family member seriously injured), and seven aspects of area deprivation. The characteristics of the family had a stronger effect than the deprivation of the local area.

4.8. PRE-SCHOOL BEHAVIOURAL PROBLEMS

Young children (pre-school age) can show behavioural problems. How appropriate is it to diagnose disruptive behaviour disorders (DBDs) [68] for such children? On the one hand, early identification can allow for treatment of a relatively resistant problem [69]. On the other hand, there is a risk of "over-pathologising normal behaviour in young children that represents developmentally deviant but transient manifestations of dysfunction" (Banaschewski 2010 p1). For example, tantrums and physical aggression are symptoms of DBDs, but three-quarters of two year-olds show some form of these behaviours (Wakschlag et al 2010).

The wider issue is how to define abnormality or disorder. This is usually done as deviation from the norm/typical (Wakschlag et al 2010):

i) "Deviations in degree"

a) Different to age-appropriate norms - For example, symptoms of DBDs include "loses temper" and "defies adults". But "the challenge is to identify meaningful cut-points for early childhood which mark the level at which the frequency of the behaviour moves from within the range of normal variation to clinical significance" (Wakschlag et al 2010 p4).

b) An exaggeration of normal development - eg: anger - extreme intensity and/or easily triggered.

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[68] DSM-IV distinguishes oppositional defiant disorder (ODD) (eg: irritable disposition; resistance to authority figures) (appendix 4C) and conduct disorder (CD) (eg: aggressive; disregard for others and social norms) (Wakschlag et al 2010). ODD and CD (ie: persistent anti-social behaviour) affect 5% of the population, with a high risk of adulthood criminality, and drug and alcohol misuse (Loeber and Farrington 2000).

[69] This assumes that childhood disorders are "downward extensions" of adult or adolescent disorders (Wakschlag et al 2010). While Moffitt et al (2007) worried that "down-ageing" criteria for older children risked over-diagnosing younger children.

ii) "Deviations in kind" - Behaviours that are not part of normal development (eg: physical cruelty; callous disregard of others).

However, the application of some of the symptoms of DBDs to pre-school children are developmentally impossible (eg: truancy; forcible sexual activity), developmentally improbable (eg: fire-setting; stealing with confrontation), or developmentally imprecise (eg: "often loses temper"; "often defies") (Wakschlag et al 2010).

Thus the need to establish validity for DBDs and pre-schoolers. This can be done in different ways (Wakschlag et al 2010):

a) Correlation of reports by different observers - eg: parent and teacher.

b) Comparison of age groups - eg: similar prevalence rates.

c) Criterion validity - eg: correlation of DBD symptoms with observed disruptive behaviour or self-reports of anti-social behaviour.

d) Stability of symptom over time - eg: assessment of the same child at different ages.

e) Response to interventions for disruptive behaviour.

Wakschlag et al (2010) preferred to see DBDs as based on four core dimensions:

1. Temper loss - regular overt expression of anger (eg: destructive tantrums; trouble calming down when angry). Normative tantrums are short-lived - eg: 75% of 18-60 month-olds less than five minutes long (and closer to one minute in many cases) (Potegal and Davidson 2003).

2. Aggression - tendency to respond aggressively in a range of situations (eg: hits adults; hurts others on purpose). Normative aggression in early childhood is common, but not frequent (eg: up to 10% of 2-3 year-olds reported by parents to "often" hit others; Wakschlag et al 2010). It exhibits a predictable developmental pattern including particular forms of aggression (eg: in response to frustration).

3. Non-compliance - resistance to and failure to comply with rules and norms (eg: sneaky about rule breaking; automatic resistance when asked to do something). Non-compliance normally increases from the toddler, but declines with sophistication in language

(eg: verbal negotiation).

4. Low concern for others - including lack of empathy and lack of guilt about transgressions (eg: little concern about pleasing others; limited change in behaviour after being punished).

Waksclag et al (2010) were concerned that the symptoms of DBDs identified in pre-school children may "falsely suggest continuity" (ie: the beginnings of later life problems). For example, only one-quarter to one-half of pre-schoolers diagnosed with DSM-IV DBD met the same criteria 12-24 months later (Kim-Cohen et al 2005).

4.9. APPENDIX 4A - DIATHESIS-STRESS MODEL

Not all studies have confirmed the findings of Caspi et al (2003), and one of the reasons may be related to how life stress is measured (eg: self-report checklist of negative emotions). These characteristics do not distinguish the meaning of the event to the individual, nor its uniqueness, severity, or timing (Hammen et al 2010).

Hammen et al (2010) used multiple measures of life stress in their study of 346 Australian adolescents, who were part of the Mater University Study of Pregnancy (MUSP) birth cohort in Brisbane, Australia. Chronic (long-term) family stress was calculated from eleven measures of marital and parent-child relationships over the past six months from the adolescents, their mothers, and fathers where available. A standardised score for family discord was calculated (with a higher score signifying more discord) for the adolescent at age fifteen years.

Acute (short-term) stress was measured by a semi-structured interview at age 19 years about eleven negative life events between 15-19 years old (eg: major academic failure; victim of crime). Each event was rated on a five-point scale.

The version of the 5-HTTLPR gene was determined from a blood sample, and the outcome measure was self-reported depression at age 20.

It was found that only chronic stress at age 15 predicted depression at 20 years for female adolescents with one or two short versions of the gene. Put another way, females with a short version of the gene and having experienced chronic stress had significantly higher depression scores than other groups (figure 4.13).

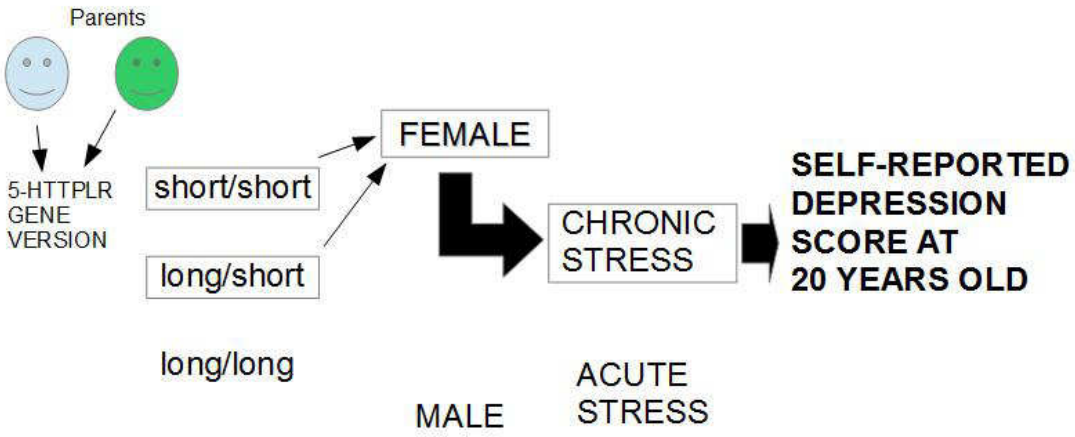

Figure 4.13 - Relationship between stress, the 5-HTTPLR gene and depression found by Hammen et al (2010).

4.10. APPENDIX 4B - NEIGHBOURHOOD EFFECT

Criminal activity and substance misuse tends to be more common in neighbourhoods of individuals with low SES, and high unemployment and divorce, for example. But how much is the neighbourhood the cause of the behaviour beyond the characteristics of the individuals (Sariaslan et al 2013)? [70]

For example, Goodnight et al (2012) found that neighbourhood disadvantage as rated by mothers could predict the conduct problems of their offspring (as rated by mothers and offspring), and as compared to cousins in different neighbourhoods.

Establishing causality is always difficult. The experimental method is the best way to do so. The "Moving to Opportunities" (MTO) project in the USA involved moving families to more affluent neighbourhoods. Females in these families had less property and violent offences subsequently than controls not moved, but males who moved had more property crime and behaviour problems and lower violent offences than controls (eg: Briggs et al 2010) [71] [72].

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[70] Interestingly, US studies generally find an effect whereas European studies generally do not (Sariaslan et al 2013).

[71] But in assessments 4-7 years later, there was no impact on economic outcomes (eg: Kling et al 2007).

[72] Clampet-Lundquist and Massey (2008) saw the MTO project as a weak intervention that was not able to show the neighbourhood effect. They argued that the "low-poverty but predominantly minority neighbourhoods into which most MTO movers relocated are not capable of producing substantial improvements in the economic outcomes of MTO families. Moreover, the fact that many families who were offered the chance to relocate through the MTO programme did not do so, and that some MTO movers subsequently moved to higher-poverty areas on their own, compromises the demonstration's experimental design by imparting selection bias to estimates of the MTO intervention's effects" (Ludwig et al 2008 pp145-146). Ludwig et al (2008) contested this argument at length.

Sariaslan et al (2013), using extensive Swedish data [73], found that the neighbourhood effect was not present for violent crime and substance misuse after controlling for individual characteristics. This was a quasi-experimental study using secondary sources [74].

All individuals born in the three largest city regions in Sweden between 1975 and 1989 (n = 297 752) were assessed at age 15 and 20 years old. Data were taken from the Total Population Register, the Medical Birth Register, the Multi-Generation Register, the Primary School Register, the Patient Register, and the National Crime Register. There were no interviews with individuals. Neighbourhood deprivation was calculated for areas of about 500 inhabitants. This was done based on proportions of welfare recipients, unemployed individuals, immigrants, divorced individuals, individuals not completing secondary schooling, median disposable income, residential mobility (ie: length of residents' stay in area), and crime rates [75]. The 1049 neighbourhoods were ranked in deciles (10% groupings).

Initially, statistical analysis showed that an increase in one standard deviation in neighbourhood deprivation score increased the risk of violent crime conviction by 57% and substance misuse by 31% (figure 4.14) [76]. But when family variables (eg: parental education; single parent status) and individual characteristics (eg: birth weight) were added to the statistical model, the associations disappeared [77].

Overall, Ludwig et al (2008) said: MTO "shows us that moving out of a disadvantaged, dangerous neighbourhood into more affluent and safer areas does not have detectable impacts on economic outcomes four to seven years out. However, such neighbourhood moves do have important effects on other self-reported measures of the wellbeing of program participants (which surely count for something), on adult mental health and some physical health outcomes, and on violent behaviour among young people" (p182).

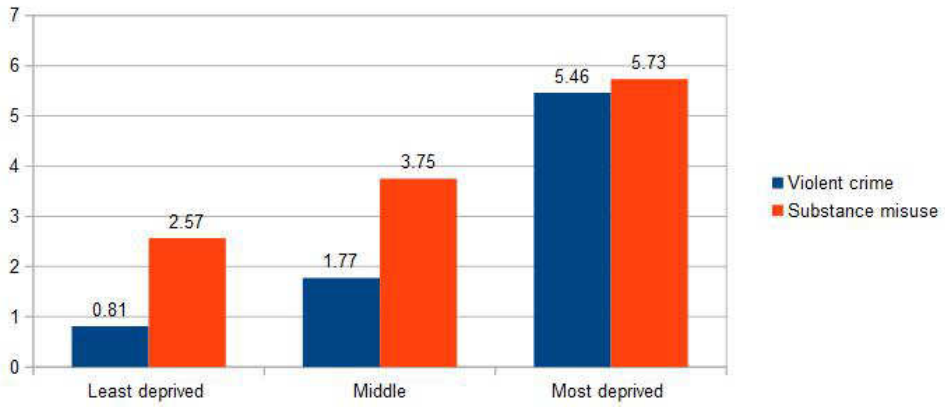
[73] Oakes (2013) described it as "an astonishingly rich data resource that seems available nowhere else, certainly not in the USA".

[74] Oakes (2013) observed that he "might quibble with the Authors' use of the term 'quasi-experiment'. I reserve this term for designs with an exogenous intervention/treatment that is not randomised by a researcher or by Mother Nature".

[75] Oakes (2013) questioned the construction of the deprivation index including whether divorce and immigration status "really imply deprivation".

[76] A seven-fold increase in violent crime from the lowest to the highest decile of deprivation (ie: 0.008 risk in an advantaged neighbourhood versus 0.055 risk in a deprived neighbourhood) (Oakes 2013).

[77] Oakes (2013) noted that "neighbourhood context affects people and people affect neighbourhood context", which makes it difficult to isolate individual, family and neighbourhood variables.



(Data from Sariaslan et al 2013 table 2 pp1062-1063)

Figure 4.14 - Percentage of participants convicted of violent crime and substance misuse based on neighbourhood deprivation deciles.

Put another way, conviction for violent crime, for example, is more common among individuals from deprived neighbourhoods due to individual, family and neighbourhood factors together [78]. "Instead, it seems that there are selection processes at work that lead high-risk individuals into socio-economically deprived neighbourhoods as a factor predisposing to criminality and substance misuse" (Sariaslan et al 2013 p1064).

Oakes (2013) was left unsure by the findings: "It could be that neighbourhoods do not affect study outcomes. Or, it could be that neighbourhoods cause the observed seven-fold increase in risk. We cannot tell because we cannot identify the desired effects in observational designs, no matter how astonishing and plentiful the data" (p1068).

The study had two main weaknesses:

a) The use of conviction data only (ie: those not convicted or caught missed). Official crime statistics are not comprehensive - "one could argue that official statistics for crime partly reflect policing practices, with the targeting of individuals of lower SES resulting in greater risk of conviction for individuals of lower SES than for those of higher SES" (Sariaslan et al 2013 p1064).

b) The use of a single measure for neighbourhood deprivation.

[78] A sub-analysis of siblings within families showed that family context "proved to be highly influential" (Sariaslan et al 2013).

4.11. APPENDIX 4C - OPPOSITIONAL DEFIANT DISORDER (ODD)

ODD is characterised in DSM-IV-TR (APA 2000) as the "recurrent pattern of negativistic, defiant, disobedient, and hostile behaviour toward authority figures", as shown by the symptoms of "often argues with adults" and "often actively defies or refuses to comply with adults' requests or rules". But the six other symptoms do not specify who the defiance is towards - "often blames others for his or her mistakes or misbehaviour"; "often loses temper"; "often deliberately annoys others"; "is often touchy or easily annoyed by others"; "is often angry and resentful"; and "is often spiteful or vindictive". So, the target could be parents, teachers, or other children (Alves de Moura and Burns 2010).

Taylor et al (2006), using teacher ratings of 1358 US kindergarten children, found that oppositional defiant behaviour towards teachers was a different construct to the behaviour towards peers.

Alves de Moura and Burns (2010) confirmed this distinction with confirmatory factor analysis on data from a sample of 692 elementary schoolchildren in a city in Brazil (average age 8 years old), and mothers' and fathers' ratings (mostly biological parents). The parents independently completed a Portuguese version of the Child and Adolescent Disruptive Behaviour Inventory (CADBI) (Burns et al 2001). This included rating the eight symptoms of ODD, which were rewritten specifically to all cover adults (parents, grandparents, babysitters, and other adults) (eg: "argues with adults") and children (brothers, sisters, and peers) (eg: "argues with other children").

On the positive side, programmes to help parents can reduce anti-social behaviour (eg: SPOKES). Supporting Parents On Kids Education in Schools (SPOKES) ran from 1999 to 2001 in eight schools in south London with 5-6 year-olds (Scott et al 2010).

Parents were observed playing with their child, and then behaviours like praising desirable behaviour, and paying attention to the child were encouraged. The children's anti-social behaviour was reported by parents and teachers. The children receiving the parental training showed a significant improvement in anti-social behaviour compared to the control group after 28 weeks (Scott et al 2010).

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5. CHILDBIRTH, ILLNESS, AND DEATH

5.1. EXPERIENCES OF MOTHERS OF PRE-TERM BABIES

For about the last quarter of a century medical technology has improved such that pre-term (or premature) and very-low-birth-weight (VLBW) babies are more likely to survive than before. There is a lot of research on the medical aspects of babies born weighing 1500 g or less, but much less on the experience of being a mother of such a child [79].

Mothers of pre-term babies face distinctive stressors immediately after birth - ie: the child being in the neonatal intensive care unit (NICU). The appearance and behaviour of the baby in the "incubator", the limitations on physical contact, and the length of hospitalisation, and fears for the child's survival are all specific concerns such that studies report that about half of mothers of these infants have high levels of anxiety and depression immediately post-birth. The emotional distress can continue after hospitalisation with unpleasant memories of the NICU, and concerns over the infant's development (Holditch-Davis et al 2009) [80].

Research on the experience of the mothers has been both quantitative and qualitative [81]. Quantitative studies

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[79] Pre-term birth is an example of an obstetric complication, and these can have psychological effects for the mother (appendix 5A).

[80] Baum et al (2012) argued that evidence of the traumatic effects of a pre-term birth for the mother is difficult because "it is impossible to know how much the mother's distress is rooted in the premature delivery and how much it is rooted in the infant's condition" (pp595-596).

[81] The popular media and scientific research talks about "baby brain" or "placenta brain", where pregnant women experience memory and cognitive problems. But pregnant and maternal rats, for

use easy to score questionnaires and look for statistical patterns between variables (eg: the larger the baby the milder and briefer the mother's distress) or comparisons with full-term births (eg: higher scores of depression among pre-term mothers). Qualitative studies seek to understand the experience of the mothers (and occasionally the fathers) (Baum et al 2012).

The experience of stress for mothers of newly-born pre-term infants can vary depending on social variables, like income, and ethnicity. For example, some studies have found greater emotional distress among African American mothers of premature babies. However, many mothers of such infants do not experience distress. Holditch-Davis et al (2009) sought to discover the different patterns of distress after the premature birth among African American mothers.

The researchers recruited, from two hospitals in North Carolina, 177 African American mothers of pre-term infants weighing less than 1500 g or requiring mechanical ventilation at birth [82]. Data were collected in the hospital, and then 2, 6, 12, 18 and 24 months later. The Parental Stressor Scale: NICU (PSS:NICU) (Miles et al 1993) was used initially to measure the stress experienced due to the child's appearance in the NICU, and the differences in the parental role compared to full-term births. There are 29 items rated on a five-point scale of "not at all stressful" to "extremely stressful". Other measures were also taken of depression, anxiety, and post-traumatic stress symptoms, and of daily hassles.

For the subsequent data collection, either by postal questionnaire or face-to-face interview, the researchers used the Worry Index (Miles and Holditch-Davis 1995), and the Parental Stress Scale: Prematurely Born Child (PSS:PBC). The former measures self-reported worries about the infant in seven areas (eg: the infant returning to the hospital). The PSS:PBC has twenty items about general concerns about raising a baby (eg: getting child to sleep through the night).

Analysis of the data produced four categories of women:

a) "Low distress" - Low scores on all measures both at birth and throughout the study (n = 56 mothers).

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example, show improved cognitive performance compared to virgin females (Christensen et al 2010; appendix 5B).

[82] Infants hospitalised for longer than their first two months of life were excluded from the study.

b) "High (NICU-related) stress" - High scores on PSS:NICU post-birth, but lower scores on other measures. The infants were sickest (eg: smaller birth weight; longer mechanical ventilation) (n = 49).

c) "High depressive symptoms" - High scores on measures of depression, anxiety, and post-traumatic stress symptoms in particular (n = 37).

d) "Extreme distress" - Highest scorers on all measures throughout the study. The mothers had the lowest mean educational level of the groups, the second most sick infants at birth, and the most life stresses. Holditch-Davis et al (2009) pointed out: "Even at 24 months, 56% of mothers in the extreme distress class had elevated depressive symptoms, 65% had elevated post-traumatic stress symptoms, 77% had elevated daily hassle scores, 76% had elevated worry scores, and 70% had elevated parenting stress scores. This prolonged emotional distress is concerning because chronically distressed mothers have been found to be more bothered by infant behaviours, to have poorer perceptions of their children, to be less responsive to their children, and to report less attachment to them" (n = 35).

There was no difference between the groups in maternal age nor marital status (among other variables).

Overall, the level of psychological distress in the NICU predicted the stress experienced over the following two years.

Misund et al (2013) found mental health problems still after 20 months among mothers of pre-term babies in Norway. The babies were born before the 32nd week of pregnancy at the Oslo University Hospital. The mothers were interviewed two weeks after birth (T0; baseline), two weeks after discharge from hospital (T1; median 2.7 months post-birth), eight months (T2) and twenty months after birth (T3).

Maternal mental health was measured by three standardised psychometric questionnaires each time:

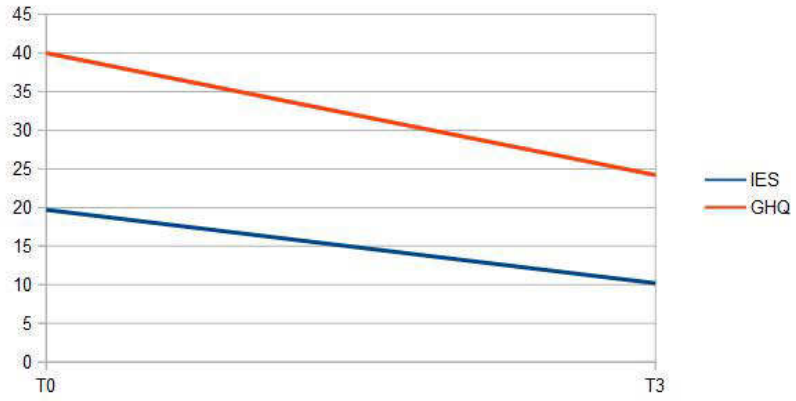
a) Impact of Event Scale (IES) (Horowitz et al 1979) - Fifteen items (scored 0-5) measuring post-traumatic stress symptoms. A cut-off of 19 or above was used (range: 0-75).

b) General Health Questionnaire (GHQ) (Goldberg and Williams 1991) - The thirty-item version scored on a four-point scale (0-3) measures distress, mental health problems, and overall well-being (range of scores: 0-90).

c) Spielberger State-Trait Anxiety Inventory (STAI) (Spielberger et al 1970) - A measure of anxiety (range:

0-40).

The mean scores for the measures showed significant reductions from T0 to T3 (with most of the decline between T0 and T1) (figure 5.1). The STAI had the least decline. At T0 66% of the women had a psychiatric diagnosis, 52% at T1, 48% at T2, and 31% at T3. High scores on the measures were correlated with older age of mother, and previous psychological distress, in particular, and with pregnancy and birth issues like pre-eclampsia, and caesarian.



(Data from Misund et al 2013 table 3)

Figure 5.1 - Mean scores at T0 and T3.

Ethical considerations are always important in such studies. Firstly, written consent was obtained at each stage, and the women were given the right to withdraw at any point. Five mothers refused to participate at T0, and three withdrew before the end of the study. So, of 34 women approached, 26 completed the study.

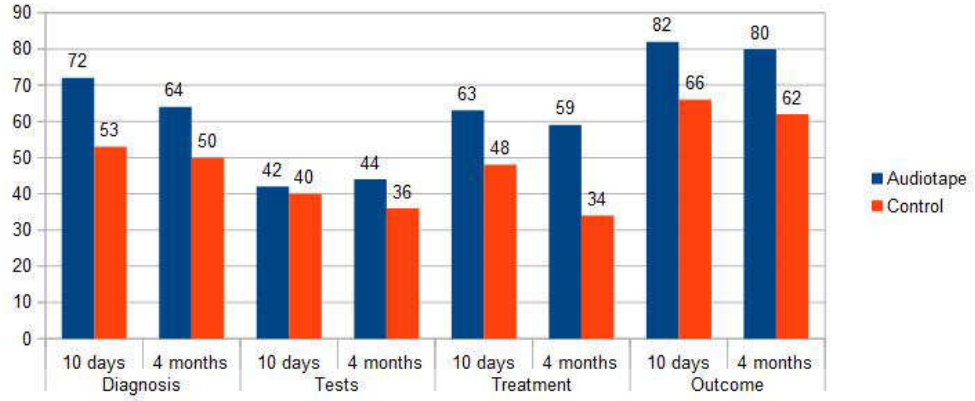
Any mother who scored as a clinically significant mental health problem were referred for psychological treatment. Though this could have influenced the results, the researchers said: "A no referral procedure could have caused unnecessary suffering for both mother and child" (Misund et al 2013). There were twenty such mothers by the end of the study (and fifteen accepted help).

Mothers of babies in neo-natal ICUs given audiotape recordings of conversations with doctors had better recall of information, but no difference in well-being and stress than mothers without recordings (Koh et al 2007) [83].

[83] Interestingly, "mother of babies with poor outcome who received the tapes were significantly more

One hundred and two mothers were given the recordings and 98 not at the Townsville Hospital, Queensland, Australia, between July 1999 and December 2001. The women were allocated randomly to the two conditions. The mothers were interviewed about recall of doctor's information, and psychological well-being ten days and four months later.

At ten days and four months, taped mothers recalled significantly more information about the diagnosis of the child's condition, the treatment to be undergone, and the predicted outcome, but only about the tests to be carried out at four months (figure 5.2).



(Data from Koh et al 2007 table 1 p29)

Figure 5.2 - Percentage of mothers recalling information based on audiotape or not.

5.1.1. Qualitative Studies

Garel et al (2006) interviewed twenty mothers of very pre-term babies from two maternity units in France. Researchers performed one-hour long semi-structured interviews at one year after birth. The interviews were audiotaped and fully transcribed. The focus was upon the experience of the mothers and their perception of their babies.

Most of the mothers reported fatigue (partly due to working and partly due to the babies' wakings), feelings of guilt and anxiety, and showed signs of depression. Many of the feelings were related to the baby being very pre-term. Garel et al (2006) pointed out that the

satisfied with the conversation than similar mothers in the control group" (Koh et al 2007 p30).

children were "probably more demanding at this stage thus generating fatigue and stress. Some mothers were also caught in a vicious circle, their loss of self-confidence worsening with the child's difficult behaviour" (p141).

One mother said: "My body is not made to have children. I am unable to carry them until term". Others referred to their behaviour as causing the pre-term labour - eg: "did something wrong", or should have "worked less". The anxiety was focused on the child's health and development as summed up by one woman who said: "Because she is pre-term, I am afraid that something might happen to her".

Another mother reported: "Because she was pre-term, I wonder if we were too lenient with her. This might explain why she is so irritable. We do not know how to cope when she has a tantrum".

Eight mothers spontaneously described the delivery as traumatic and the memories not fading with time - eg: "I was upset on his first birthday and again when our friends had a baby". It should be noted that no information was collected about the mental health of the women pre-pregnancy or pre-birth.

Overall, the study highlighted that the mothers were struggling with a "worrying" level of distress one year after birth. The qualitative approach to the interview allowed the researchers to explore the experiences of the women, and "to observe attitudes and feelings that are difficult to explore by questionnaire such as guilt, shame or ambivalent feelings towards the baby. It also allowed us to interpret the mothers' answers as close as possible to their meaning. For instance, we could identify defence mechanisms like denial or idealisation, and consider them as indicators of anxiety and attempts to cope with it rather than a positive answer" (Garel et al 2006 p141).

Baum et al (2012) performed in-depth, face-to-face interviews with thirty mothers of VLBW premature babies at a large hospital in Israel. The interviews took place 3-9 weeks after delivery. Analysis of the interviews using a phenomenological approach produced four main themes.

i) The premature delivery as a traumatic event - Often because of the suddenness and speed of delivery, or the risk to the child and mother. This was similar to the reports of women who underwent emergency caesarian sections (with full-term babies) (eg: Ryding et al 1998).

ii) The mother's attributions for the premature delivery - These included self-blame (eg: eating the wrong foods; having stressful lives), blaming someone (or something) else (eg: "evil eye"), or a "life saver". In the latter case, one mother of twins said: "[Two days

after the birth], when one of my twins began to show problems, I realised that the body is a very smart machine. I realised that there was a problem with the smaller of the foetuses that had brought on the end of the pregnancy. The bigger one felt her sister's distress, and pushed her out. It saved her life, because they could treat her outside the womb" (p599).

The self-blame can be seen in this woman's explanation as having spread her pregnancies too far apart: "Maybe my body reacted that way because of the age difference between my children. You know I have a 15 year-old son. So a lot of time went by between births. Maybe it's because of that. My body forgot what pregnancy is" (p598).

This statement by one woman is a an example of blaming someone else: "There's a girl I work with... and she can't have children. That same day she saw me and gave me an intense look. She said, 'You're finally showing'. I don't know if this is related. I can't prove it. That girl was eating her heart out, she was so jealous of anyone at work who got pregnant... Maybe people who can't have children find it hard to accept, and when they see pregnant women they get jealous" (p599).

iii) The feeling of "no longer pregnant but not yet a mother" - The women felt that the truncated pregnancy had meant that they were not ready to be mothers yet which was reinforced by initial bonding problems. In the latter case, one interviewee said: "When I saw the baby for the first time, it was very hard for me to look at him. I had an image of a cute little boy, and instead I see a boy hooked up to instruments; a boy whose life was in danger. I said to myself, 'First let's get over this first stage, and let's hope the boy survives'" (p600).

Not being ready is characterised by this interviewee: "Every woman who knows she is going to give birth goes through a kind of psychological process where you begin to be afraid of the birth. She asks herself what's going to happen and how it's going to be... I never went through that. Therefore I wasn’t ready to give birth" (p599). In the "role exit theory" (Ebaugh 1988), individuals can have a "vacuum experience" ("marked by fear, anxiety, and being 'neither here nor there'") if there is not a smooth disengagement from one role/identity to another (as in pregnant woman to mother).

iv) The mother's behaviour to safeguard their infants - This included "magic" or spiritual means - eg: "I brought each of the twins an amulet, and also gave each a 'Book of Psalms'". Mothers of all backgrounds (including secular and religious), different levels of education and income tried such "methods". Baum et al

(2012) commented: "The use of magical means by the mothers in this study might reflect not only their concern for their baby's health, but also their sense that they had not been able to protect their baby by keeping it in their womb full term" (p603).

Attempts at the parenting role were also important - eg: "I sit next to her all day. I watch over her and feel her. In this way, I feel that I contribute to her health... I love her very much, and convey that feeling to her" (p601).

Evaluation of Baum et al (2012):

1. The use of open-ended questions (eg: "how was the pregnancy?"; "how do you explain the fact that the pregnancy was not full term?") during the 30-90-minute interviews that allowed the women to speak and lead the interviewer in terms of what matter to them.

2. The interviews were conducted by a social worker or chief nurse (members of the research team) at the NICU. Baum et al (2012) explained their reasoning here: "we gave considerable thought to whether the interviews would be best conducted by external interviewers or by ourselves. We were concerned that the mothers would be reluctant to reveal negative feelings to staff members with whom they were in daily contact and on whom they were somewhat dependent. Nevertheless, we were concerned that, in their sensitive condition, they would be reluctant to speak with a stranger, and wondered whether they would not prefer to speak to someone they knew and who knew them and their newborn" (p597).

3. Ethical issues handed sensitively - confidentiality and anonymity guaranteed, informed consent, and no pressure to participate in the study. "To make sure that the mothers participated voluntarily, we did not ask for an immediate answer, but rather required that those women who wished to be interviewed approach us with their request" (Baum et al 2012 p597). The choice of 3-9 weeks post-delivery for the interviews was a balance between the freshness of the experience and the immediate post-birth potential distress.

4. A varied sample of women were recruited in terms of age of child at delivery (pre/post 28 weeks), birth weight, age of mother, marital status, ethnicity, and education, for example. Thirty respondents is quite a large number for a qualitative study (but small compared to a quantitative study). The sample was convenient (ie: those available in one hospital in one country), and so its representativeness is questionable (and consequently the generalisability of the findings). No details are

given about when or how the interviewees were recruited.

5. Phenomenological analysis of the data focused on the women's experiences, but this approach is criticised as subjective compared to methods based on quantitative data.

5.1.2. Maternal-Foetal Attachment

John Bowlby's work in the mid-20th century highlighted the importance of the relationship between the baby and the mother (main caregiver), but subsequent research has shown that an attachment forms pre-birth - "pre-natal attachment" or maternal-foetal attachment" (MFA) (Alhusen 2008). There is a correlation between MFA and pre-natal health practices, and between pre-natal and post-natal attachment for the mothers (Alhusen 2008).

Cannella (2005) reviewed the studies on MFA up to the year 2000, while Alhusen (2008) updated the review until 2007. The latter concentrated on original research published in English between 2000 and 2007 using four popular electronic databases and a selection of search terms. Twenty-two studies were classed as relevant to review.

Alhusen (2008) identified a number of issues from the studies:

i) How to define and measure MFA - Cranley's (1981) definition was the first - "the extent to which women engage in behaviours that represent an affiliation and interaction with their unborn child" - and she developed most commonly used Maternal-Fetal Attachment Scale (MFAS). It has 24 items (eg: "I speak to my baby in the womb" and "I imagine myself nursing my baby") scored from 1 ("very much so") to 5 ("entirely not so") (Levine et al 2007).

There is also the Prenatal Attachment Inventory (PAI) (Muller and Mercer 1993) and the Maternal Antenatal Attachment Scale (Condon and Corkindale 1997).

ii) The use of technology and MFA - eg: the role of two-dimensional (2D), three-dimensional (3D) and four-dimensional (4D) ultrasound. Methodological issues limit the knowledge of whether longer time viewing an ultrasound or the type of ultrasound influence MFA.

iii) Demographic variables - Few studies on ethnic differences in USA, for example.

iv) Maternal mood - One study found that women with a low MFA had significantly more pre-natal anxiety and depression. But this study had only a small homogeneous

sample (Alhusen 2008).

v) Past pregnancy experiences and current MFA - eg: whether loss of previous pregnancy has an influence.

vi) Assisted reproduction - One study found no difference in MFA between women conceiving via in vitro fertilisation (IVF) and naturally (Alhusen 2008).

vii) Multi-foetal pregnancies - No difference in MFA between mothers of twins and singletons.

viii) Perceived barriers to MFA - eg: self-reported pre-natal drug use.

ix) Mother's childhood memories of own upbringing has a positive effect.

x) Socio-economic status (SES) - Many studies that found factors that improve MFA were correlated with higher SES and factors like improved access to care and stable family relationships.

Overall, MFA is related to planning of pregnancy, strength of supportive relationships (eg: spouse), and gestational age. But Alhusen (2008) was critical of the reviewed studies for using small homogeneous samples (usually White, higher income, and married).

Levine et al (2007) reported a correlation between MFA and levels of the hormone oxytocin in the blood over the pregnancy.

5.2. ILL CHILDREN

Dealing with childhood chronic illness (eg: cancer) is stressful for the family. Acute lymphoblastic leukaemia (ALL) is the most common childhood cancer.

"Childhood cancer is a unique disease; despite being told that their child is seriously ill, parents are advised by healthcare professionals that it is in the child's best interests for his or her future health and well-being that families attempt to lead as normal a life as possible. Endeavouring to follow this advice during the subsequent 2–3 years of treatment becomes a high priority for families dealing with chronic illness" (Earle et al 2006 p155).

Earle et al (2006) investigated the attempt to lead a normal with two-year longitudinal study using participants in ALL-97 (a UK national study of treatments for ALL). Thirty-two mothers agreed to be interviewed 3-4 months after their child's diagnosis of ALL, and then 12 and 24 months later. The children ranged in age from 3-16

years old.

Thematic analysis of the semi-structured interviews produced five themes:

i) Recommendations from professionals - Doctors advised to "keep some normality and order in the house". But the reality was difficult, as one mother admitted: "I don't think they [health professionals] realise because they've never actually lived with it. They say things like just carry on as normal, it's a bloody silly thing to say because you can't" (p157).

ii) The effect of illness on daily life - Mothers were faced with many concerns (eg: infections; remembering medications), and normal life was inevitably disrupted (especially for working mothers). As time passed the pattern of regular hospital visits settled down. "As some normality was achieved, mothers could 'indulge' their own feelings and realised that striving for normality could be an attempt to distract themselves: 'I wanted to get back to normal a bit, which is understandable but I think I'd bottled it up for so long, I'd never really had a good cry'" (Earle et al 2006 p157). Other emotions experienced by the mothers included jealousy of others. One mother said: "Normality is a wonderful thing and people don't realise it until they haven't got it" (p158).

iii) Barriers to a normal life for children - These included changes in eating habits, missing school, and pain. As time passed, for some children, it was easier. "Appearance was also more normal and children were able to return to school and routines: 'I don't feel like she's living 24 hours in hospital in a very sheltered environment and very away from real life'" (Earle et al 2006 p157).

iv) Parenting concerns - "The need to balance the needs of the sick child while maintaining discipline was a common concern: 'I've been so over-protective all this time and now it's time to get him to normality'" (Earle et al 2006 p157). Some mothers coped by playing down the differences between their lives and others, as one mother said in the second interview: "Life's normal now, other than medicine and going for outpatient appointments. But then loads of kids do that, don't they?" (p158).

v) Strategies to achieve normal life - eg: realistic appraisal: "It's never going to be the same as it was before". In the third interview, one mother said of her daughter's experience: "She's so mature".

In summary, the mothers welcomed the advice from doctors to live a normal life, but found it difficult (as

they described in interview 1). In interview 2, mothers tended to either report living a normal life, or be disappointed that they could not. This difference was evident in the third interview with some able to adjust. "These mothers stated the need to accept that the 'old' life was gone and a new normality necessary. This included adapting to the changes, re-prioritising and attempting to achieve normality in the areas of life that could be controlled (eg: parenting). Those who had attained this also reported feeling more positive, stronger and able to forget about the cancer when not in clinic... [Thus} The cancer experience becomes a constant striving for normality that can be a helpful goal, but also potentially damaging where it proves elusive" (Earle et al 2006 p159).

5.2.1. Disability Paradox

Albrecht and Devlieger (1999) referred to the "disability paradox" - "the discrepancy between the objective limitations and suffering posed by certain disabilities, and the reasonable or excellent quality of life (QL) reported by some individuals living with them" (Carona et al 2013 p971). The paradox has two versions - (i) the discrepancy between the self-reports of daily limitations and positive quality of life scores, and (ii) the difference between the negative view of others about the disabled individuals' lives and the individuals' positive quality of life scores (Carona et al 2013).

The idea was originally applied to individuals with disabilities, but it is relevant to caregivers/parents of such individuals. Thus, Carona et al (2013) asked: "why do some of these parents reported increased levels of caregiving burden, and still perceive a similar or superior QL [quality of life], in comparison to those parents who care for healthy/able-bodied children" (p971). One explanation is called "response shift" - "a change in the meaning of one's self-evaluation of QL as result of changes in internal standards, values and the conceptualisation of QL" (Sprangers and Schwartz 1999 quoted in Carona et al 2013) (eg: lowering expectations).

Carona et al (2013) concentrated on caregivers of children (8-18 years) with cerebral palsy (105 parents compared to 117 matched control parents in Portugal). The main measures were the World Health Organisation Quality of Life Assessment: Brief Version (WHOQOL-BREF), and the Revised Burden Measure. The former has 26 items (scored 1-5) covering three areas of quality of life - physical (eg: "Do you have enough energy for everyday life?"), psychological (eg: "How satisfied are you with yourself?") and social relationships (eg: "How satisfied

are you with your personal relationships?") [84]. The scores converted into a standardised score (0-100) with a higher score signifying positive quality of life.

The Revised Burden Measure covers objective burden of caregiving (eg: "Have your caregiver responsibilities left you with almost no time to relax?"), subjective burden (eg: "Have your caregiving responsibilities created a feeling of hopelessness?"), relationship burden (eg: "Have your caregiving responsibilities caused conflict with your relative?"), and caregiving uplifts (eg: "Have your caregiving responsibilities given your life more meaning?"). All items were scored on a five-point scale. For the burdens, a higher score was a more negative experience, while a higher score on the uplifts was a positive life experience.

Overall, there were no differences in quality of life scores between the two groups of parents [85], but caregivers of children with cerebral palsy reported significantly more subjective burden, and less uplifts. For these parents uplifts moderated the effects of the burden scores, and thus the lack of difference in quality of life scores between the parent groups. It is as if the small uplifts for the parents of disabled children matter so much more to them, and are some compensation for the burdens etc.

Carona et al (2013) had proposed the following hypotheses:

i) Parents of children with cerebral palsy would have lower quality of life scores than the control group - Not supported by the data.

ii) Parents of children with cerebral palsy would report higher burden scores and lower uplifts than controls - Partly supported for subjective burden and uplifts.

iii) The burden scores would negatively correlate with quality of life, and the uplifts positively correlate with quality of life - Simple linear relationships were not found, and the results "depict a more complex and varied frame of correlations" (Carona et al 2013) (eg: subjective burden strongly associated with psychological quality of life, but relationship burden weakly correlated to quality of life domains.

iv) Parents with higher uplifts scores would report better quality of life across all types of burdens - This

[84] There is a fourth aspect (environmental), which was not used in this study.

[85] The only difference in quality of life was between parents of children and parents of adolescents (irrelevant of health of child).

was partly supported by the data (eg: uplifts mediate the relationship between objective burden and psychological quality of life).

Overall, Carona et al (2013) felt that the findings highlighted the adaptability of parents with children with cerebral palsy (though this did vary between measures).

5.2.2. Depression

Mothers of children with special needs are more likely to experience depression than mothers of healthy children, mostly due to the demands of caring for such a child (ie: child-related stress) (Sipal and Sayin 2013).

However, there are differences depending on the child's disability. For example, over a three-year period [86], mothers of children with hearing loss or neurological impairment (eg: cerebral palsy) had similar levels of stress and depression, while mothers of children with Downs syndrome reported lower depression scores (Hanson and Hanline 1990).

The amount of social support (and perceived social support) influences the amount of stress and depression experienced by the mothers. Social support includes the number of people in social networks, perceived emotional support, and instrumental support (direct help) (Sipal and Sayin 2013). For example, Hintermair (2000) found a negative correlation between number and frequency of supportive interactions with other mothers, and stress and depression among mothers of hearing-impaired children. Social support can also help in maintaining positive parenting behaviours during maternal depression (Sipal and Sayin 2013).

Sipal and Sayin (2013) studied 103 mothers of children who were deaf aged 36-72 months old in Ankara, Turkey. Depression was measured by a Turkish version of the Beck Depression Inventory (BDI) which covers twenty-one common symptoms of depression (each rated 0-3). Scores of nine or below were classed as no depression, 10-20 as dysphoria, and over 20 as depression.

Perceived social support by family, friends, and a significant other was based on twelve items (eg: "I get the emotional help and support I need from my family") (rated 1-7), and giving a maximum score of 84. Higher scores indicated higher perceived social support [87]. The Parental Attitude Research Instrument (PARI) (Schaefer

[86] The study involved 35 mothers and their children aged 3-4 years old.

[87] This was a Turkish version of the Multidimensional Scale of Perceived Social Support (MSPSS) (Eker et al 2001).

and Bell 1958) measured characteristics of parenting like authoritarian parenting style (eg: obedience important), hostility (towards parenting), and democratic attitudes (eg: treat child as an individual).

About a quarter of mothers were classed as depressed and one-third not (figure 5.3). Perceived social support from family and friends (but not significant other) was significantly related to depression score. Mothers with depression had more negative parental attitudes (eg: high authoritarian and hostility score on PARI). So, social support indirectly led to more positive parenting attitudes by reducing depression.

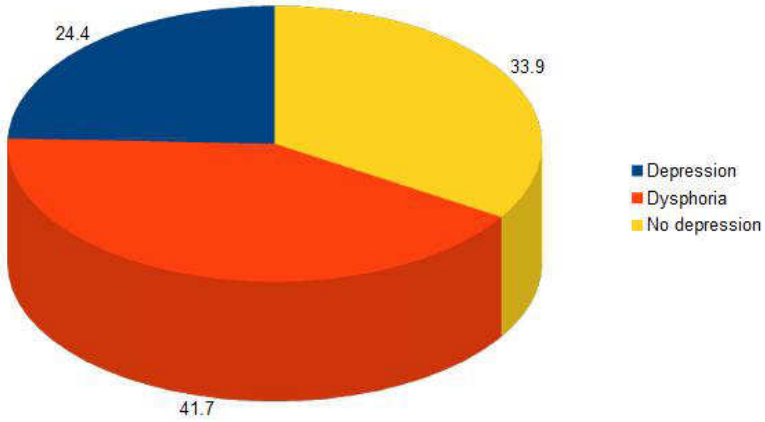


Figure 5.3 - Mothers (percentage) and categories of depression.

5.3. CHILD MORTALITY

In absolute terms, the number of deaths of under 5s worldwide has nearly halved in the last twenty years (12 million in 1990 to 6.9 million in 2011; United Nations data) (Hanf et al 2013). But the death rate for this age group is still high in certain parts of the world (eg: sub-Saharan Africa), and from the common killers of pneumonia, pre-term birth complications, and diarrhoea (Hanf et al 2013).

Hanf et al (2013) analysed United Nations and World Bank data for 2000 to 2009 to discover the factors involved in high infant mortality.

Income was the key factor. "As an economy grows, there are more direct resources to rapidly improve nutrition, access to medical care, housing, and other conditions that are related to better health. Furthermore, the associated relation with mortality in under 5s indicated that more than about $40 000 per capita, based on purchasing power parity, further improvements in a nation's economy had a limited impact

on mortality in under 5s. Such a result supports the proposition that when economic development reaches a certain threshold, its effect on child health levels" (Hanf et al 2013 p3).

Access to clean water and sanitation services had medium term benefits (ie: time lag between changes and reduction in mortality), as did urbanisation, HIV transmission rates from mother to child, availability of public health services, maternal education, and young age of mother at birth (but only in high and upper-middle income countries).

Perceived official corruption was another factor - it "impacts on the mortality by simultaneously disrupting immediate accessibility to and quality of health systems, and long term national health investments (for example, construction of health facilities, education of health professionals)" (Hanf et al 2013 p4). Violence in society (eg: civil war) had an indirect effect by disrupting health and government services.

"Surprisingly, undernourishment did not appear as a clear determinant of mortality in under 5s. What can be said from this result? Definitively not that undernourishment does not kill children. Undernourishment should rather be seen as a proximal determinant of other global determinants of mortality in under 5s. Similarly for undernourishment, no clear action of the perceived level of democracy was found. The previously observed relation between democracy and health is likely to be mediated by other variables included in our model" (Hanf et al 2013 p4).

Putting the factors together, infant mortality is reduced by having a reasonable level of income, being an educated, slightly older mother, in a country with good quality water and sanitation (probably living in a city), and health services without official corruption and organised violence, and low maternal HIV transmission rates.

5.4. SUDDEN INFANT DEATH SYNDROME

Sudden infant death syndrome (SIDS) [88] or colloquially, cot death [89] has had a number of explanations proposed.

The latest focus is upon environmental factors. These include general factors like socio-economic deprivation, or specific aspects of the child's sleeping environment.

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[88] SIDS tends to be used for sudden unexpected deaths in infancy without an explanation as opposed to "explained deaths" (Carpenter et al 2005).

[89] Barrett (1954) introduced the term "cot death" (or "crib death") for unexpected infant deaths without an obvious explanation.

In the latter case, Blair et al (2009) found a greater risk of SIDS for babies who slept with an adult in the same bed (co-sleeping) including on a sofa, and the adult had consumed alcohol or drugs.

Eighty SIDS cases in south-west England were compared to 87 random controls and 82 high risk of SIDS controls (young parents; socially deprived; mother who smoked) in a case-control study [90]. This method works backwards from the event looking for differences compared to the controls who did not experience the event. In this case, the event is death of the child in early life.

Where there was co-sleeping and alcohol/drug use by adult, the risk of death was over fifty times greater for the SIDS group than the random control group, and over eleven times greater than the high risk control group. Other environmental factors were also found, but they were less important - eg: covering the infant's head; baby sleeping in the side position.

Other studies have shown that co-sleeping is a risk where there is maternal smoking (both current and during pregnancy), for infants under twelve weeks old (whether maternal smoking or not), with longer duration of co-sleeping (ie: as child ages), and also co-sleeping with siblings (Mitchell 2009).

Mitchell (2009) stated about recent research: "We have learnt that SIDS is largely preventable" (p874).

5.4.1. Multiple Deaths

One issue with the death of an infant is whether it was "unnatural" (ie: criminal death). This can be difficult to establish, particularly when there are no clear signs of violence, say. Even more controversial is a second cot death in a family - a "simple tragedy or something more sinister" (Upfront 2007) (eg: undetected hereditary disease vs infanticide).

A traditional view is that "a second SIDS with one mother is impossible..." (DiMaio and DiMaio 1989 quoted in Carpenter et al 2005). But studies have shown that siblings of infants with SIDS have an increased risk of SIDS themselves (eg: Guntheroth et al 1990).

Carpenter et al (2005) reviewed 46 cases of sudden unexpected and apparently unexplained infant death in England, Wales, and Northern Ireland via the Care of the Next Infant (CONI) scheme, and concluded that forty were "natural" (eg: SIDS) (and the other six were "probably homicide") [91].

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[90] This was a small sample because of the reduction in deaths from SIDS in the UK since the 1990s due to advice to parents to avoid the side sleeping position and to use back sleeping (Mitchell 2009).

[91] The distinction of deaths into "natural" or "unnatural" has been criticised (eg: Gornall 2006). Carpenter et al (2007) defended their study.

But Bacon and Hey (2007) felt that only twenty of them were "natural", while 20 were "undetermined", and six cases were "unnatural". The authors said: "One of the difficulties of distinguishing between sudden infant death syndrome and covert homicide [92] is that both tend to occur against a background of social disadvantage" (Bacon and Hey 2007 p130).

Furthermore, they said: "We would encourage professionals to keep an open mind in assessing unexplained infant deaths, to be aware of the difficulties in diagnosis, and to try to keep a balance between the need to support parents and the need to protect children" (Bacon and Hey 2007 p131).

5.5. TWO METHODOLOGICAL ISSUES AND EXAMPLES

5.5.1. Interpreting Correlations and Associations

Drawing conclusions from associations or correlations between two variables always requires caution (especially in terms of assessing causation). There may be a third variable (apparently hidden) that accounts for the association. Thus the need to control for certain variables when doing statistical analysis of data.

For example, among 5-11 year-olds in Southern England, Stevenson et al (2010) found a positive association between hearing loss and behaviour problems (ie: more hearing loss and greater behavioural problems). Or put another way, the behaviour problem score of the hearing impaired children was significantly higher than the hearing children. But this relationship was mediated by language ability. When this was controlled for in the analysis, it was found that it was low language skills (whether hearing impaired or hearing) that was associated with behaviour problems (figure 5.4).

Language skills was measured by "The Bus Story" (Renfrew 1995) [93]. The child recounts a story from pictures. The average number of words in a sentence are calculated, and the child is placed in relation to the average for the group. Thus "low language skills" is the bottom 25%, and "high language skills" is the top 25% of children. Behaviour problems were measured using the Strengths and Difficulties Questionnaire (SDQ) (Goodman 1997) [94] as rated by parent and teacher.

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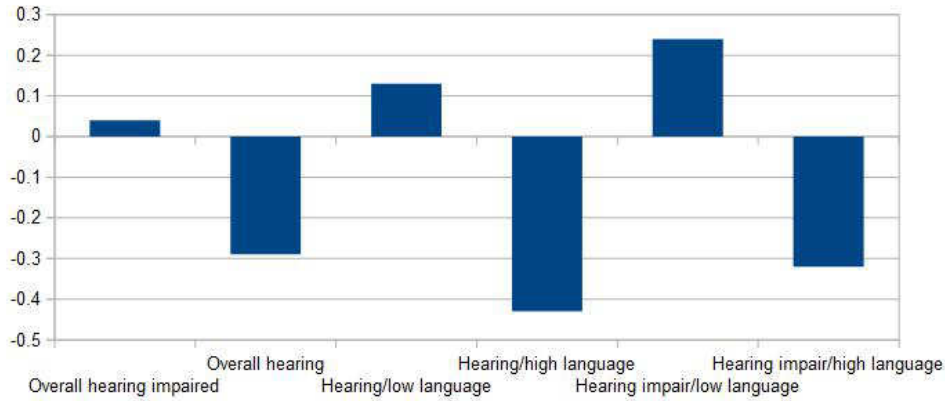
[92] Covert homicide is "an unnatural death that was not initially recognised as such" (Bacon and Hey 2007 p129).

[93] See http://busstory.us/.

[94] Details at http://www.sdqinfo.com/.



(0 is average for the whole sample and a plus score is more behaviour problems)

Figure 5.4 - Mean z-scores for behaviour problems.

In another study, Fiese et al (2010) found that asthma severity correlated with separation anxiety, but this was mediated by the family environment (ie: responsive, organised, secure or chaotic, unresponsive, insecure).

Families of 63 9-12 year-olds with persistent asthma were recruited in the USA as the "Family Life and Asthma" study. The key measures were:

i) Asthma - A spirometry test on the child's expiration (breathing out) gave an objective measure of lung function, and the caregivers completed the 14-item Childhood Asthma Severity Scale (CHAS) (Ortega et al 2001) for asthma-related events in the past year.

ii) Separation anxiety - The child completed the computer-assisted Diagnostic Interview Schedule for Children-Youth Version (DISC) (Jensen et al 1995), which covered eleven symptoms.

iii) Family environment - A structured observation of mealtime interactions was made via video-recordings made by the family. Two independent raters then coded the behaviour using the Mealtime Interaction Coding System (MICS) (Dickstein et al 1994). This included four seven-point scales for:

- Task accomplishment - structure and progression of the meal: chaotic (1) to well-planned (7).
- Roles - roles and responsibilities of family members in relation to the meal: inappropriately distributed (1) to clear (7).

- Interpersonal involvement - involve and interest in others: extreme lack (1) to empathetic towards others (7).

- Affect management - expression of emotions: restricted or inappropriate (1) to appropriate (7).

Separation anxiety symptoms were positive correlated with spirometry test score (where a higher score signified poorer lung functioning) ($r = +0.35$; $p<0.01$), and with CHAS (eg: separation anxiety and parent-reported wheezing: $r = +0.28$; $p<0.05$).

The child were divided into two groups - separation anxiety (n = 17) and no separation anxiety (n = 46) - for analysis of mealtime behaviours. There were significant differences between the groups on three measures. The separation anxiety group had lower scores on task accomplishment (mean: 3.8 vs 4.9), roles (4.13 vs 5.13), and affect management (3.8 vs 4.77).

Then the severity of the asthma was assessed in relation to mealtime interactions. Poorer lung function was significantly associated with lower task accomplishment, roles, and interpersonal involvement. Medication adherence was controlled for.

The lower scores on the MICS were taken as a sign of a chaotic, unresponsive, and insecure family environment. Taken together the findings show that the relationship between asthma and separation anxiety was mediated by such a family environment. So children experiencing the symptoms of asthma seek emotional closeness to caregivers and security, and if these are not received, symptoms of anxiety develop, which become connected to the physiological symptoms of asthma.

5.5.2. Multiple Outcome Measures

Studies often use one measure of children's behaviour (eg: parent report), but multiple outcome measures give a more comprehensive picture.

For example, in their study of English children with cleft lip, Murray et al (2010) used four different measures of the children's social behaviour:

i) Teacher reports - Teachers completed the Teacher Report Form (TRF) of the Child Behaviour Checklist (CBCL) (Achenbach 2001), which measures emotional and behavioural adjustment (eg: internalising problems like depression).

ii) Maternal reports - Mothers completed the CBCL.

iii) Observation by researchers - The child's social engagement was categorised in thirty-second blocks over

thirty minutes of observation in the playground. Seven categories of behaviour were used: positive group play, positive one-to-one play, standing on the fridge, alone, distressed, aggressive behaviour, and interacting with the teacher.

iv) Children's responses - The children completed a measure of self-concept. They also acted out two scenarios with dolls (eg: "Friend's Party") while their responses were scored by the researchers.

Based on previous studies, the researchers predicted that the children with a cleft lip would have poorer social relations. The participants were ninety-three children with cleft lip (index group), and 77 matched controls, all aged seven years old.

From the teacher reports, children with a cleft lip were rated significantly higher in social problems, as anxious-depressed and withdrawn-depressed as well as internalising problems (but not externalising problems) than controls, whereas the maternal reports produced no significant differences.

From the playground observations, the index children were significantly more likely to be categorised as "alone" (57% vs 36% of time blocks), and less likely to be in "positive group play" (39.5% vs 60%) than controls. Two other categories had no significant differences ("positive one-to-one play" and "standing on the fringe"), while the others were excluded from analysis as rarely observed.

From the children's responses, there was no difference in the self-concept measure, but in the doll play, the index children included more negative reactions (eg: reaction by other children) than controls.

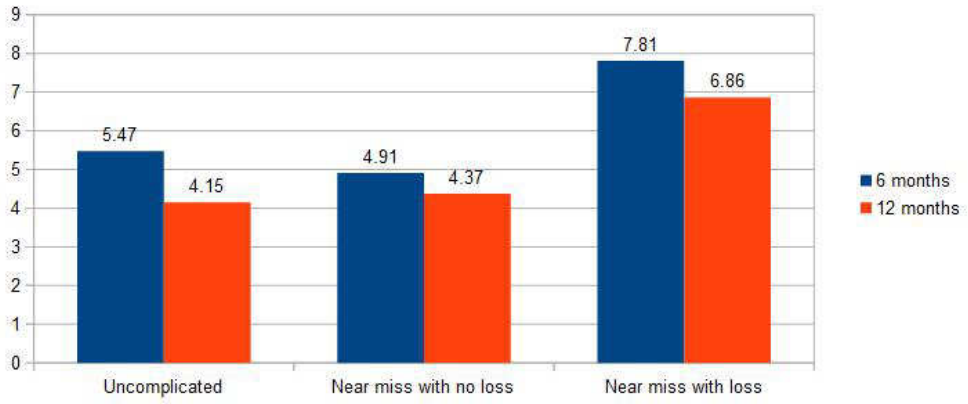
Overall, children with a cleft lip experienced social difficulties and problems at school, but not at home. Murray et al (2010) concluded: "Our findings indicate that school context, and possibly more general situations, entailing social interactions with relatively unfamiliar people, are especially challenging for children with clefts" (p102).

5.6. APPENDIX 5A - OBSTETRIC COMPLICATIONS

Severe obstetric complications can lead to death of the mother and/or child during pregnancy or at birth. Where the mother survives, it is classed as a "near-miss", and there can be long-term psychological distress consequently. Complications and near-misses are more common in developing countries, like Benin, West Africa.

Fottrell et al (2010) interviewed 694 women soon after a near-miss with or without loss of the baby, and six and twelve months later in southern Benin.

Psychological distress was measured by ten symptoms in the last month (eg: feel hopeless; worthless; so depressed that nothing could cheer you up). Women who experienced a near-miss with loss of the baby had significantly higher psychological distress at six and twelve months than a near-miss without loss or an uncomplicated pregnancy (figure 5.5). The loss of the child was more important than the near-miss for the mother.



(Data from Fottrell et al 2010 table 2 p21)

Figure 5.5 - Mean score of psychological distress (out of 40).

5.7. APPENDIX 5B - CHRISTENSEN ET AL (2010)

Using data from the Personality and Total Health (PATH) Through Life Project in Australia, Christensen et al (2010) found no support for persistent cognitive deterioration in pregnancy and motherhood. Over 700 women recruited in 1999 at age 20-24 were assessed again in 2003 and 2007. In each case, they completed four types of cognitive tests:

i) Cognitive speed - eg: substitute as many digits for symbols as possible in 90 seconds.

ii) Working memory - eg: repeat backwards a series of digits just presented forwards.

iii) Immediate recall - eg: immediate recall of sixteen nouns.

iv) Delayed recall - eg: recall of nouns after another task.

This study was a prospective one (ie: women not

pregnant at beginning of study), whereas previous research has tended to use volunteers who were pregnant, and these individuals could differ to the "average" pregnant woman (Christensen et al 2010).

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