A probabilistic model on child abuse

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Abstract

Objective

This paper attempts to identify the factors which lead to child abuse and implement these factors within a mathematical probabilistic model which can predict the likelihood that a child will be abused. Additionally, the intensity of the probable abuse can be computed. These computations are thought to help the clinician to make a decision on when and how to intervene.

Method

While there are many factors involved in child abuse which are well established within the existing literature (e.g. the age of the child), other factors are less well understood. Hence, this paper approaches the issue in the following manner. In case, where a factor has been clearly identified, such a factor has simply been acknowledged. However, in case such a factor is less clearly understood and little or no empirical data are available, the approach is more theoretical and based upon *thought experiments*. Once the relevant factors have been established they are implemented within a mathematical model which predicts both the likelihood of abuse and its intensity.

Results

It has been found that these are the relevant factors accountable for child abuse: Accessibility, Age of the child, Number of caretakers, Strength of support network, Ability of the child, Mental Health of caretaker, Parenting skills and Deterrence. The model has been tested against 5 virtual situation and appears to be functional.

Conclusion

Although this paper has been able to establish the major factors involved in child abuse and to demonstrate that the model is functional, before this model can be implemented within a clinical setting a specific instrument will have to be designed including sub-scales such as the narcissistic hypersensitivity scale.

1 Introduction

The fact that child abuse is integral part of our western society has been well documented (e.g. US Department of Heath and Human Services, 2003; Attorney-General's Department Australia, 2001; Hong Kong Medical Coordinators on Child Abuse, 2003 and NSPCC UK, 2005). However, as much as there is agreement that abuse takes place, there is little agreement elsewhere. For instance, while the Hong Kong Medical Coordinators on Child Abuse (2003) report that 41.9% of abuse had been paternal and 24.7% maternal, the US Department records the figures as 18.8% for paternal abuse and 40.8% for maternal. These figures are so much in conflict with each other that it raises serious questions. Still, even worse, what establishes abuse is far from being universally defined within our society. For instance, while UK law prohibits harsher forms of physical punishment, this is not the case in the US, where corporal punishment is legal in all states and in some states, including Florida, Kentucky and Mississippi, even corporal punishment in school is accepted (compare: the UN Secretary General's Study on Violence against Children – Toronto, 2005). However, even more fundamental than all these issues, is the issue that disclosure of child abuse itself is so difficult (compare: McFarlane & Krebs 1986 and Dziech & Schudson, 1989), that it begs the question whether any of these statistics are correct or near correct. In order to make this point clear: Who will ever know what happens between an infant and her or his caretaker behind closed doors? And it comes with little surprise that the US Department of Health and Human Services (2003) states that 0.1% of the reports are made by the perpetrator. This simply means: No, we will never know what happens behind closed doors. This situation is not being helped by the fact that it has been highly politicized. On the one end of the spectrum we have the feminist theory (e.g. Dobash & Dobash, 1979) and on the other hand of the spectrum, we have a misogynous attitude as represented by websites such as http://www.dvmen.org/dv-2.htm amongst many others. Clearly, there is not only disagreement and confusion, there are legal issues and there are hostilities. In fact, it appears to the author of this article that not enough effort has been put into understanding the factors of abuse. Such an understanding however is necessary if child abuse is to be reduced within our society. This now, is the intention of this article to identify such factors. Hence, the author will attempt to specify these factors which lead to child abuse, integrate them within a probabilistic mathematical model and subsequently discuss aspects of the validity of the model, its implication for the reduction of child abuse and present an outlook on aspects for future research. However, before such a model can be developed, we will need to establish a more precise understanding of what we consider to be child abuse. Subsequently, we can discuss the factors which lead to child abuse, construct the mathematical model and finally point out some of its implications touching the question of how to reduce child abuse effectively.

2 What is child abuse

The fact that what establishes child abuse, is, as mentioned above, far from being well defined is generally known and has been observed by Biviano (1996). However, the author argues that, in order to obtain a functional definition, we will have to refer to the concept of intentionality as introduced by Searle (1983). Using the concept of intentionality, the question of whether an action establishes abuse or not has to be reformulated into the question of whether abuse was intended or not. For instance, if a parent drops a pot onto the foot of a child by mistake, we do not have the situation of abuse, but the situation of an accident. However, if this action was intended to harm the child, then the situation of abuse is given. But how can the child know the difference? It is by the reaction of the parent; if the parent comforts the child after the incident, the child will be reassured that this was an accident. If however, the parent remains cold or even aggressive, the child knows the intention and knows that (s)he has been abused. Thus, a definition of abuse will be of the from:

Definition:

Abuse is, when a care taker has negative intentions towards a child.

It is not the pain which hurts so much, it is knowing the hostile intention of the perpetrator. As much as this might appear to be a satisfying definition, it does not come without difficulties. Even without entering the realm of classical psychoanalytical theory and its concept of reaction formation (where under the pretence of positive intention a negative intention is executed), we simply never know for sure what someone's intentions are. True, there are obvious cases, where a care taker simply looses her/his temper and batters a child. In such a case there can be no doubt about the negative intention, but there are other situations which are far less clear. Still, so the author claims, referring to an intentional definition of abuse, this approach appears far more promising than any other approach to abuse. The author will give an example of how operational this definition is: As reported by Lipshires (1994), psychologist Marcia Turner had a female client who once said to her: "The little three-year-old girl in my household is coming on to me, and wants me to have sex with her. I think I will, because I know that I will be gentle and kind to her, and it's inevitable that she is going to be abused." Now, according to Lipshires, this statement has to be seen as female sexual abuse. However, referring to the above definition of intentional abuse, it is not. This is not to say, that the female client is right in what she intended to do - and so she should be told, but it appears that she had no intention of harming the child and hence the situation of abuse is not given. This client simply followed a misconception and her behaviour ought to modified through re-eduction. However, someone with negative intention is far less likely to be re-educated. One further advantage of this definition is, that it allows for cultural differences. This is, while, as stated above, the US allows corporal punishment and the UK does not, it simply would not make sense to call US parents abusers. This does not mean that corporal punishment can be considered a healthy parenting style (compare: the UN Secretary General's Study on Violence against Children – Toronto, 2005), but this is an issue of politics rather than an issue of individual families.

While the study by the US department of health and human services (2003) classifies abuse into: Physical abuse, neglect, medical neglect, sexual abuse, psychological maltreatment and other abuse, the study of the Attorney-General's Department Australia (2001) classifies abuse into: Major Assault, minor assault, total physical assault and sexual assault. This difference is interesting: While the US approach focuses on the type of maltreatment, the Australian approach focuses on the severity of the maltreatment with the exception of sexual maltreatment. However, both aspects, or let us say dimensions, are of importance. There is certainly a difference between a minor assault (such as smacking) and a major assault (such as breaking a limb), because of the effect it has on the victim. On the other hand, the type of maltreatment is important too, because it indicates a different motivation of the perpetrator (compare Donnelly, 1992). For instance, a parent suffering from depression is more likely to neglect the child, while a parent suffering from alcoholism is more likely to be both neglectful and physically abusive. Both dimensions will have to be integrated into the model of child abuse: The severity of the abuse and the motivation of the perpetrator.

Note that we are deliberately moving away from the etiological model of child abuse as introduced by Bornfenbrenner (1970), because of its heavy theoretical constructed nature. This paper in contrast seeks to identify factors which are largely independent from such theoretical assumptions and which can be measured through the design of appropriate instruments. However, before we consider factors of child abuse, the author feels it is important to consider sexual abuse separately as it is quite different in nature to other abuse in terms of gender differences.

2.1 Sexual abuse

Sexual abuse differs from physical, emotional and other abuse considerably. While the study by the US department of Health and Human Services (2003) claims that the majority of abuse directed

against children is maternal, it appears that the majority of sexual abuse is male (Pearson, 1997) with 25% of female sexual abuse and 75% male sexual abuse. Here the number of female sexual abusers seems to be higher than elsewhere (e.g. Fritz, Stoll & Wagner (1981) report 10% female and 90% male), but whatever the real number is, all studies indicate that male sexual abuse is significantly higher than female sexual abuse. This gender difference is interesting but perhaps more striking is the fact that the form of sexual abuse strongly depends on gender. As noted by Rosencrans (1997) the standard definition of sexual abuse, which is seen as aiming at the sexual gratification of the perpetrator, has to be extended when referring to female sexual abuse.

Possibly the most striking difference is that while male sexual abuse is violent and aggressive, female sexual abuse tends to be more suttle. While male sexual abuse generally involves penetration (which can be physically extremely painful to the child), female sexual abuse involves more *creative* conduct (compare Lipshires, 1994). Female sexual abuse includes forms of exhibitionism, voyeurism, administering of unnecessary enemas, urination, mastrubation, insertion of objects into the vagina and anus (Craig, 1991) and seems to be less concerned with the aim of sexual gratification. As noted by Hastings (2000), the sexual arousal component of sexual abuse appears to be predominately applicable to male and not to female perpetrators. Further, Hastings argues that what establishes sexual abuse itself depends on culture by referring to the ancient Greek society where it was common for men to use boys for anal sexual acts (compare Plato's *Symposium*). However, in order to understand the gender difference, it might be useful to refer to the concept of cognitive similarity.

Female sexuality is fundamentally different from male sexuality if looked at from a cognitive point of view. The author will briefly point out how such a difference can be explained. Without entering the realm of psychoanalytical thinking - centred around the concept of the persecuting breast as introduced by Klein - we can argue that the breast is of different meaning to a female compared to a male. An infant who has been breastfed will naturally find breasts attractive because due to cognitive similarity breasts are associated with a positive experience. As a female reaches puberty, she herself develops breasts which are highly sensual and sexual, invoking auto-erotic and latent homosexual feelings. Later, when a female finds herself in the position of breastfeeding, she experiences a role reversal. Such role reversal is more than likely to produce elements of projection and introjection which contain sensual and sexual elements. If this is the case, we can expect that female sensuality and sexuality is far more complex than male sexuality (as a male will never experience this role reversal) and that female child care contains sensual and sexual elements. This also would explain why female sexual abuse is more *creative* and likely to involve elements of caring and sensuality. As argued by Hastings (2000) it appears that what establishes female sexual abuse is far from being understood, a situation which is not helped by the fact that our society suffers from an obsession with sexual abuse, a sign that we are far from being comfortable about our own sexuality.

Hence, the author argues to practice caution in relationship to female sexual abuse as the boundaries are very fuzzy. Male sexual abuse on the other hand seems much more obvious and dangerous to the victim involving enormous physical and emotional pain (e.g. “If you tell anyone, I will kill you.”) leaving victims traumatised and suffering from severe post traumatic stress syndrome. It is generally accepted that sexual abusers display strong narcissistic traits (e.g. Brad & Knight, 1987; Levin & Stava, 1987; Chantry & Craig, 1994).

3 Factors leading to child abuse

3.1 Accessibility

If we are to believe the US Department of Health and Human Services (2003) than mothers account

for the fast majority of maltreatment of children. As mentioned above the latest figure stands at 40.8%. If it is true that mothers account for the majority of abuse, we have to ask the question: Why? Although the author appreciates that there are a number of reasons, he claims that there is one major reason and this is accessibility. If someone has no access to a child, this person cannot abuse the child. In our society, women have most access to children as mothers, grandmothers, babysitters, primary school teachers and nurses while the access of males to children is very restricted. Looking at the issue logically, if a person *A* and a person *B* whose probabilities *p* to become abusive are equal, with *A* having more access to a child than *B*, we find that *A* is more prone to maltreat this child than *B*. If this probabilistic approach is correct, than we have a very good explanation why women are the main perpetrators (if they are the main perpetrators).

3.2 Number of Caretakers

There exists no study to the knowledge of the author of this article which investigates this issue systematically. The author's hypothesis is such: The greater the number of caretakers is the less likely it is that the child will be maltreated. Indeed, there is some evidence which supports this hypothesis. There are several studies (e.g. Drake & Pandey, 1996; Coulton, Korbin, Su & Chow, 1995) which provide evidence that the maltreatment of children is higher amongst single mothers than it is amongst children growing up in a two parent home. The reason why this is, is complex, but the very fact that to look after a family alone is more difficult than to do it in a partnership appears to be the most quoted. Interesting, in this context, are the observations by Spiro (1965) about the children of the Kibbutz. During the 70's, children grew up in Israel's Kibbutzim freely and were looked after by several caretakers. Spiro's description indicates a warm and understanding environment, which – so the author argues – might be partly due to the fact that several caretakers were present as well as older children. Again, we will make use of a logical argument: According to the report by the US Department of Heath and Human services (2003), the rate of victimized children stands at 13.8 per 1000. That is 1.38% of children. Even if this number is higher in reality and even if we set the number (we call it *a*) at 90% of potential abusers, we would still be faced with the fact that the chance that two potential abusers find each other and collaborate amounts to a probability of a^2, with $a^2 < a$ for $a < 1$. This is 0.19% for the US figure and 81% if 90% of the population were abusers. Clearly, the potential abuser will be inhibited by the presence of a non-abuser, and hence the more non-abusers surround an abuser the more will this potential abuser be inhibited. Surely, most abuse takes place behind closed doors where the abuser is not inhibited and is alone with the child (compare Finkelhor, 1984). A case like Frederick and Rosemary West happens just once in a life time.

3.3 Age of victim/child

According to the report by the US Department of Health and Human Services (2003), we find that young children are particularly vulnerable and are more likely to be abused. The statistics are the following:

Age (years)	***Percentage of Abuse***
0 to 3	16.4
4 to 7	13.8
8 to 11	12.7
12 to 15	10.7
16 to 17	5.9

A linear regression analysis produces a correlation of $r^2 = 0.94$ ($p < 0.01$). Interesting however is the sudden drop of abuse from the age group 12 to 15 compared to the age group 16 to 17. This indicates a form a non-linear regression, an issue we will discuss further on.

3.4 Motivation to Abuse

A classical psychological hypothesis introduced by John Dollard relates frustration to aggression. The more an individual is frustrated the more likely it is that this individual will display aggressive behaviour. However, as Fromm (1970) argued the link between frustration and aggression cannot explain the fact that aggressivness varies enormously between individuals and societies, and hence frustration cannot be considered an explanation for abuse at least not as a single factor. More recently, a direct correlation between empathy and aggression has been found (Feshbach, 1964; Feshbach, Feshbach, Fauvre & Ballard-Campbell, 1983). This aspect will be of importance later on. Other researchers such as Rosenstein (1995) relate aggression to stress. However, similar to Fromm's argument, individual and social differences in dealing with stress are so great, that stress cannot explain aggression or at least not solely. Moreover, so the author argues, stress seems to be the response to certain factors such as too much work, too little money etc., that stress cannot be seen as the problem but as an indicater of an underlying problem. Hence, we will not refer to stress as a factor in this study. To make the point more clear: Someone who is stressed is so because of lack of support, mental illness etc., but aggression will come into play only if this person lacks empathy, exaggerates her/his own needs etc. (Wiehe, 2003). Instead of frustration and stress, the author identifies four main factors which will lead to abuse. These are:

- Strength of the support network (compare: Olds, 1998)
- Ability/disability of the child (compare: Sullivan & Knutson, 2000)
- Parenting skills (compare: Donnelly, 1992)
- Mental health of the caretakers (compare: Wiehe, 2003)

We will discuss these factors in detail below.

3.4.1 Strength of the support network

There exists conclusive evidence as produced by Olds and his team (e.g. Olds, 1998 Olds, 2002, Olds, Kitzman, Cole, Robinson, Sidora, Luckey, Henderson, Hanks, Bondy & Holmberg, 2004) that mothers who receive support through a community nurse in form of home visits are far less likely to abuse their children than women who do not receive such support. This is 4% for supported mothers compared to 19% for unsupported mothers (Olds, 1998). As observed by Bull, McCormick, Swann & Mulvihill (2004) the effects of universal home visits in the UK by midwives and nurses has not yet been investigated systematically.

However, the support network does not have to consist of community nurses only, but could involve the wider family, friends, access to information and financial support. The only issue is that these variables are far from easy to quantify and more work will have to be conducted in this area. Such work could be done by comparing the rate of child abuse within societies where caretakers receive child benefit payments through the government with societies where caretakers do not receive such support.

Before we move to the second motivation of abuse, we return to the issue of frustration and aggression, or – as it is commonly more known – stress and abuse. It is a common place within our society to argue that, for instance, single mothers are more likely to abuse their children because they are more stressed, and hence stress ought to be integrated within a model of abuse. However, so the author argues, stress is nothing but an expression of lack of support. If a single mother is stressed then this is the result from the fact that she has no time off or that the financial situation is precarious or simply that she might be isolated. Hence in such cases, stress is simply an expression for the fact that the support network is weak.

3.4.2 Ability/Disability of the child

As observed by Sullivan & Knutson (2000) disabled children are more likely to be abused than able children (interesting is the question whether this includes gifted children as well). Quite disturbing is the fact as reported by Ooosterhoorn & Kendrick (2001) that disabled children find it often very difficult to understand whether they have been abused or not and often abuse can only be identified indirectly by the appearance of physical signs or extreme mood changes. However, the fact remains that they are particularly vulnerable. The question is "Why?" A normal mentally healthy person seems to be less likely to purposefully hurt someone who is vulnerable because it is against the ethics of our society. The problem is, that the abuser does not fit this picture of a mentally healthy person (compare: Wiehe, 2003). It appears that a potential abuser will be drawn to a victim, who is weak, rather than to a victim, who is strong. This explanation goes together with the fact, as mentioned above, that most abuse is inflicted on infants below the age of 3 (the weakest group) and least to youth aged 16 to 17 (the strongest group).

If, however, disabled children are more likely to be abused, we can generalize that the more able or normal a child is, the less likely (s)he is going to be abused. An assumption which goes together with the general opinion (compare Harris, 1982) that more difficult children are more likely to be abused. However, to the knowledge of the author there has not been a systematic study investigating this issue. The reason for this is fairly obvious; once a child has been abused, it is difficult or impossible to conclude whether low scores during psychometric testing are inherently part of the child's make-up or the result of the abuse. Additionally, psychometric testing is not possible with very young infants (e.g. The Kaufman Brief Intelligence test can be used for an age range 4 to 90, hence does not cover the weakest age group 0 to 3 years). However, it might be a possibility to correlated the intensity of abuse to such psychometric measures, but this remains purely speculative at this point.

3.4.3 Mental Health

The fact that mental health of the caretaker is a crucial factor has been observed widely (e.g. Feshbach, 1964; Wiehe, 1996, Wolfe, 1999). However, the most far reaching study in this context has been conducted by Wiehe (2003), who assessed abusive parents compared to foster carers along three scales (the Interpersonal Reactivity Index (IRI, Davis, 1980), the Narcissistic Personality Inventory (NPI, Raskin & Hall, 1979) and the Hypersensitivity Narcissism Scale (HSNS, Hendin & Cheek, 1997)). It was shown that abusive parents differed significantly from foster carers on the subscales: Perspective-taking, empathic concern, personal distress, authority, exhibitionism, superiority and narcissistic hypersensitivity.

3.4.3.1 Empathy

Wiehe's study (2003) demonstrates that non abusive parents show more empathy than abusive parents. The greatest difference between the two groups appeared on the sub-scale: Personal distress ($t = 3.75$ with $t_{critical} = 1.96$ for $p = 0.05$ and $t_{critical} = 3.291$ for $p = 0.001$). This means that abusive parents take their own distress more into account than the distress of their children. This was followed by *perspective taking* ($t = -3.66$) indicating that abusive parents find it hard to put an event or situation into perspective. Empathetic concern too was statistically different ($t = -3.41$) which goes to show that abusive parents simply care less about the welfare of their children.

Thus, we can conclude that abusive caretakers show significantly less empathy than non-abusive caretakers.

3.4.3.2 Narcissistic Hypersensitivity

Wiehe's study (2003) further shows that abusive parents are far more hypersensitive on the narcissistic hypersensitivity scale than their non-abusive counterparts. In fact, it appears that this is the characteristic which altogether is most dominant ($t = 6.45$ with $t_{critical} = 1.96$ for $p = 0.05$). This means that abusive parents see children's expressions as criticisms towards the abusive parent. For instance, while a mentally healthy person interprets the cry of a child as a sign that the child is in distress, the abusive parent sees this cry as a critique and offense and hence will conduct him/herself aggressively towards the child.

3.4.3.3 Narcissistic Personality

It is well documented that narcissism is linked to sexual abuse (e.g. Brad & Knight, 1987; Levin & Stava, 1987; Chantry & Craig, 1994), but it was Wiehe (2003) who investigate the issue of whether narcissism plays part in general abuse, and indeed, he established a link. While narcissistic hypersensitivity remained the single strongest difference, several subscales of the NPI produced significant differences between abusive and non-abusive foster parents. The strongest issue was found to be superiority ($t = 3.08$ with $t_{critical} = 1.96$ for $p = 0.05$) followed by exhibitionism ($t = 2.68$), authority ($t = -2.38$) and entitlement ($t = 2.31$). Other factors such as exploitativness, self-sufficiency and vanity were well below signifiance level. Thus, we can conclude that narcissistic caretakers are likely to abuse children not only sexually but emotionally and physically as well.

3.4.3.4 Depression/ postpartum depression

The effect of depression and postpartum depression in the context to child abuse has been investigated widely (e.g. Marino, 1992; Milgrom, 1992; Teti, Gelfand, Messinger & Isabella, 1995; Field, Lange, Martinez, Yando, Pickens & Bendell, 1996; Campbell & Cohn, 1997). However, quite possibly the most comprehensive study on this issue has been produced by Hendrick and Daly (2000). The figure of how many fathers and mothers suffer from depression varies but is estimated to be larger than 10%, with women to be roughly twice as likely to suffer from depression in comparison to their male counter parts. Additionally, the number of mothers who suffer postpartum depression is said to be approximately 12% and is generally measured along the Edinburgher Post Natal Depression Scale (EPDS, 1987). Accepting the figure of 19% as given by Hendrick & Daly (2000) for mothers to suffer from depression and postpartum depression at 12%, we obtain the figure of 31% of mothers being depressed after child birth. Note, the EPDS very clearly differentiates between depression and postpartum depression and hence the figures can simply be added up. As observed by Tomison (1996), most studies (e.g. Factor & Wollfe, 1990) investigate the consequences for a child living with a depressed mother rather than the form of abuse the child suffers under the hands of a depressed caretaker with the exception of a few studies (e.g. Weissman, Paykel & Klerman,1972; Hops, Biglan, Sherman, Arthur, Friedman, Osteen, 1987). These studies found that depressed mothers tend to show little interest in their children, are less affectionate, generated little communication and if approached by the child display a hostile disposition towards the child. Taking these observations into account together with the follow-up studies (e.g. Cooper & Murry, 1997), which demonstrate that children of depressed mothers are more likely to develop behavioural problems and are more likely to score below-average when developmentally assessed, we can conclude that depression is a strong predictor for child abuse in form of physical, emotional neglect as well as through aggressive behaviour.

Note, even if we had no access to empirical data (which, as shown above, we have), it is clear that someone suffering from severe depression displaying psychiatric symptoms such as retardation or stupor will quite clearly not be able to look after him/herself let alone a child. Hence we can deduct that someone suffering from a milder form of depression will be impaired in his/her ability to function as a caretaker towards a child.

3.4.3.5 Munchhausen's Syndrome by Proxy

As reported by Tomison (1996), Munchhausen's syndrome by proxy occurs rarely but ought to be taken into consideration in the context of mental health and child abuse. This particular illness was first observed by Meadaw (1977) and involves a caretaker who purposefully hurts a child and who subsequently seeks medical attention. Boros, Ophoven, Anderson & Brubaker (1995) describe a case whereby a mother would purposefully smother her baby against her breast until the baby would loose consciousness leaving the staff of the hospital at odds until she was secretly videotaped.

Clearly, a person suffering from Munchhausen's syndrome by proxy is not only likely to abuse a child, but that abuse will take place is a certainty. Evaluating a patient suffering from Munchhausen's syndrome by proxy, it would not be surprising to find that such a patient would score low on the three instruments used by Wiehe (2003), the the Interpersonal Reactivity Index (IRI), the Narcissistic Personality Inventory (NPI) and the Hypersensitivity Narcissism Scale (HSNS) and thus could be detected fairly easily.

3.4.3.6 Other mental illnesses

Quite clearly someone who cannot look after her/himself will not be able to look after someone else. In case of severe autism, Down's syndrome, epilepsy, schizophrenia, bipolar disorder etc. the condition of the parent is generally known to health and social services and hence in case of pregnancy, health and social services will intervene though quite in an over-authoritative way (Rudolph, Larson, Sweeny, Hough & Arorian, 1990)). Interesting is, as noted by Hendrick & Daly (2000), that the question whether a child ought to be removed from a severely mentally ill parent appears to be unclear, and in fact Miller (1997) argues that even if the situation for a child to remain with a mentally ill parent is not optimal it appears to be preferable to adoption. However, there is no doubt that a parent who suffers from a severe mental illness will require a strong support system.

As pointed out by Nicholson & Blanch (1994) a particular problem is the intake of medication and particularly sedating medication which renders the caretaker unable to respond to the child's needs. An issue which applies to a moderate to heavy drug abuser in the same way. Hence, we conclude that the likelihood of a child being abused by a severely mentally ill parent is rather small (Chaffin, Kelleher & Holleneberg, 1996) as long as sevices are involoved.

3.4.4 Parenting skills

The fact that parenting skills are of importance in correlation to child abuse has generally been accepted. However, what is not accepted is the instrument used for measuring parenting skills. One such instrument has been designed by Elliot & Bricklin (1996). However, there are a great variety of other instruments which measure parenting skills directly and indirectly (e.g. The Parent Awareness Skills Survey (PASS) and The Parent Perception of Child Profile (PPCP)), so that little consensus appears to exist. Additionally, questions such as whether parenting attitudes are integral part of parenting skills or whether they form an independent scale remains an unanswered question as is the question of how to define what parenting skills are. Hence, it appears to be important to offer a definition first before discussing the issue.

<u>Definition:</u>

Parenting skills consist of the intellectual and practical knowledge a caretaker has about childcare.

Note, this definition excludes factors such as patience or empathy because these are considered to be factors of the mental health category.

While it is fairly simple to test the intellectual parenting skills (referring to questions such as “How often do you wash a baby?”, “Is breastfeeding enough?”, “Should the infant lay on the side when sleeping?” etc.), practical parenting skills cannot be measured via an instrument, but require observation. This is, a questionnaire is not able to measure whether a mother identifies the cry of her infant correctly or not. Still, this does not mean that there can be no standardisation (e.g. “Does the mother succeed to calm the baby down?”, “How often does the baby cry?”, “Is the infant dressed according to the circumstances?” etc.), but observation is inevitable. This fact will be of great importance later on when discussing intervention of child abuse.

3.4.5 Deterrence

Modern deterrence theory is concerned with the question of how a criminal arrives at the decision to commit a crime. As Siegel (1992, p. 131) writes:

“Before choosing to commit a crime, the reasoning criminal evaluates the risk of apprehension, the seriousness of the expected punishment, the value of the criminal enterprise, and his or her immediate need for criminal gain.”

The general point of view is to see the criminal as a rational decision maker outweighing gain against risks. The risk assessment functions along three scales: Swiftness, severity and certainty. This is, the more swift the punishment is, the more it inhibits the criminal, and the more severe the punishment and the more certain the punishment is, the less likely it is that the criminal will execute her/his crime. These three scales are not totally independent: The more severe a punishment is the less likely it is that our society will sentence the criminal to it and hence certainty is decreased. However, for this paper a very different question is of importance: Does modern deterrence theory apply to a child abuser?

In order to answer this question, we break down Siegel's statement:

Firstly, there is the issue of disclosure (in a criminal context called apprehension). Clearly, a stranger abusing a child is far more likely to be reported by the parents than the parents are, and hence this explains why most abuse comes from the biological parents: The probability of a parent being reported is very slim.

Secondly, we have the issue of the seriousness of the punishment. Abusive parents receive little or no punishment and in the worst case the abused child will be removed from the family. Especially women are very protected by the law and tend to receive even less punishment than their male counter parts. This factum goes well together with the fact that according to the figures of the US Department of Heath and Human Services (2003) most abuse comes from the biological mothers.

The third point in Siegel's statement appears at first sight at odds; what could be the value of abusing child? However, it points to an aspect which has been ignored within the literature except in the case where Munchhausen's Syndrome by Proxy has been observed. The theory behind this mental illness has been seen as the need of the abuser to obtain attention. However, there are other aspects to child abuse which can be of interest to the abuser, such as controlling a partner through abuse (“I will hit the baby if you don't ....”) or of simple personal value (“If you don't bring me my slippers, you will not be allowed to watch TV.”). Further, abusive parents use violence as a method of punishment against their children whereby this violence intensifies in time. Finally, an abuser who is narcissistic will simply feel elevated by the fact that (s)he has abused the child. Thus, we conclude that the third item in Siegel's statement fits well in with abusive behaviour.

Fourthly, we have the criminal need which enters the risk assessment of the criminal. If I don't need something, I am not likely to commit a crime in order to get such an item. It is easy to transfer this

into to the realm of caretaker and child. A scenario whereby an easygoing child is looked after by a mentally healthy caretaker, who is in no need of more secure finances, time or support, we can feel certain that child abuse will not be an issue.

We conclude, that Siegel's criteria can be transferred into the care situation and hence deterrence theory is applicable.

4 The probabilistic model on child abuse

In chapter 4, we have established a number of factors which are correlated to child abuse. These factors are:

- Accessibility
- Age of the child
- Number of caretakers
- Motivation to abuse with subcomponents:
- Strength of support network
- Ability of child
- Mental health of caretaker
- Parenting Skills
- Deterrence

These factors are well recognized within the scientific community except that several studies include – as pointed out above – factors such as socioeconomical status, parenting attitudes, stress and gender. While the author gave a detailed reason why stress and gender had been omitted, it might be useful to explain briefly why the socioeconomical status and parenting attitudes are not seen as factors in this present paper. Parenting attitude, so the author argues, is integral part of the practical parenting skills and hence is integrated indirectly in our model. Socioeconomical status is a more complex issue. For instance, as much as poverty has been correlated to child abuse (compare Alfandary, 1993), there is no clear evidence that poverty per se is conductive to abuse. It rather seems that poor parenting skills and lack of a suitable support network are the crucial factors. Additionally, Pelton (1985) puts the question across whether poorer families are the most common participants in studies and hence there is a bias in selection of the participants in these studies. Additionally, so the author argues, it seems far less likely that a well-off family will be reported for child abuse even if child abuse takes place. Hence, socioeconmical status has been omitted.

The author does not claim that the above mentioned factors cover the entire range of factors which are involved in child abuse, but he maintains that a model which incorporates these factors will be a powerful indicator for the probability of child abuse to take place and together with a specifically designed instrument could prove valuable in the detection and prevention of child abuse.

We are now in the position to consider how to implement these factors within a model.

4.1 Accessibility component

If one caretaker looks exclusively after a child, then child abuse will take place if this carer exercises abusive means. This is, in terms of time, the probability for this caretaker to be abusive is 100%. If however, a caretaker does not spend any time with a child, the probability, in terms of time, will be 0%. Hence, we conclude, that the probability of child abuse is direct proportional to the time a carer spends with the child. Hence, we write:

$$A_p \propto t \tag{1}$$

where A_p is the probability for abuse to take place and t is the time in percent a carer spend with the child

4.2 Number of carers component

This component is more complex and is not independent from the accessibility component. The issue is easy if there is no overlap in time, then expression (1) is correct. However if there is an overlap in time (this is two or more carers are looking after the child at the same time), expression (1) is inadeqate. We hypothesize that the probability of child abuse, in terms of number of carers, is indirect proportional to the number of carers. This is:

$$A_p \propto \frac{1}{n_c} \tag{2}$$

where A_p is the probability for abuse to take place and n_c is the number of carers

Now, the situation becomes more complex if the carer C, for whom we want to determine the probability of abusing the child, spends some time alone with the child, some time in the company of another carer and yet again another time together with a group of n people. Let us say, the time spend alone is t_a, t_b the time spend with another carer and t_c the time spend with the group of n people. Now we get:

$$A_p \propto (t_a + (t_b * \frac{1}{2}) + (t_c * \frac{1}{n}))$$

Generally, we obtain:

$$A_p(C) \propto \sum_{i=1}^{m} (t_i * \frac{1}{n_{c_i}}) \tag{3}$$

where A_p is the probability for abuse to take place, m the number of caring constellations the carer C is involved, t_i is the time the carer C is in the ith caring constellation and n_{c_i} the number of carers in the ith caring constellation.

Note, expression (3) is somewhat problematic as it is static while in a real caring situation a time dependency is likely.

4.3 Age of child component

We observed earlier that the correlation between age and abuse is $r^2 = 0.94$ ($p < 0.01$). However, the range of a linear correlation is $-\infty$ to ∞, while the range for our model is to be set at]0, 1]. Hence, the linear correlation has to be substituted. Substituting this correlation by the relativistic correction term of the form:

$$\sqrt{(1-(\frac{s}{c})^2)}$$

we obtain a correlation of $r^2 = 0.99$ ($p < 0.0001$) when s is substituted by the age of the child and c by the number 18 (this is when the child is officially considered an adult). Hence, we obtain:

$$A_p \propto \sqrt{1-(\frac{a}{18})^2} \tag{4}$$

where A_p is the probability of abuse taking place and a is the age of the child

4.4 The motivational component

The motivational component has been broken down into the subcomponents: (a) Strength of support network, (b) ability of child, (c) mental health of caretaker and (d) parenting skills of the caretaker. Parenting skills have been broken down into intellectual and practical parenting skills. All motivational components are interrelated and hence are regarded as one overall factor. For instance, a caretaker looking after a difficult child will be more successful if (s)he has good parenting skills, has a good support network and is mentally healthy. On the other hand, a caretaker who suffers from depression will require a stronger support network than a caretaker who does not suffer from depression. Hence, so the author argues, an instrument ought to be designed with the subscales (a) to (d). Interesting is, that the strength of the support network needs to be measured according to the subjective perception (cognition) of the caretaker and not according to some objective guideline. Thus, an appropriate instrument is to contain items of the kind: "Do you feel you receive enough support?" and "Do you feel worse or better off because of the child?" However, the design of such an instrument exceeds the framework of this paper and leaves this issue open for future research. In terms of mental health it appears that particularly the subscale narcissistic hypersensitivity is of great importance as well as the subscale depression.

In order to implement the subscales into a mathematical model, it will be necessary to norm the subscales and test those against existing instruments. As we wish to obtain a probabilistic model, we need to set the range to]0, 1] and hence an exponential function appears to be most appropriate. Thus, we set:

$$A_p \propto M_a = e^{-s_n * a_c * m_{ct} * p_{ct}} \tag{5}$$

where A_p is the probability for abuse to take place, M_a the motivation to abuse, s_n the strength of the support network, a_c the ability of the child, m_a the mental health of the caretaker and p_a the parenting skills of the caretaker.

4.5 Deterrence

As discussed above the modern view about the criminal sees the criminal as a reasoning person. If the criminal concludes that the risk of punishment outweghts the gain, (s)he will not engage with a criminal act. Further, we pointed out that abusers and criminals are similar enough and hence deterrence theory applicable to the abusive situation.

In order to measure the strength of deterrence, an appropriate instrument will have to contain items of the kind: "If you know that you are not found out would you steal from a shop?" and "Do you think that prison is a scary place?" However, it would exceed the framework of this article to design such an instrument. The development of such an instrument will remain an issue for future research. We write:

$$A_p \propto D_a = e^{-d_{ct}} \tag{6}$$

where A_p is the probability for abuse to take place, D_a deterrence from abuse and d_{ct} the strength of deterrence of the caretaker

Deterrence and motivation are interrelated. The hypothesis, which the author proposes, is the following: The subscale deterrence and the subscale motivation are to be normed. If then the measurement of deterrence goes to produce higher levels than the measurement of motivation, abuse will not take place and if motivation goes to produce higher levels then the measurement of deterrence, abuse will take place. Thus, we write:

$$A_p \propto F(M_a, D_a) \tag{7}$$

with

$$F(D_a, M_a)=0 \, if \; D_a > M_a \wedge F(D_a, M_a)=1 \, if \; D_a < M_a$$

where A_p is the probability of abuse to take place, F is a function, D_a the deterrence from abuse to take place and M_a the motivation for abuse to take place.

Note, in case that $D_a = M_a$, we are confronted with a chaotic system where abuse is not predictable.

We are now in the position to formulate the probabilistic model on child abuse.

4.6 The overall model

Putting all components together, we obtain the following model:

$$A_p(Cr)=\sum_{i=1}^{m}(t_i * \frac{1}{n_{c_i}}) * \sqrt{1-(\frac{a}{18})^2} * F(M_a, D_a) \tag{8}$$

with

$$F(D_a, M_a)=0 \, if \; D_a > M_a \wedge F(D_a, M_a)=1 \, if \; D_a < M_a$$

and

$$M_a = e^{-s_n * a_c * m_{ct} * p_{ct}} \wedge D_a = e^{-d_{ct}}$$

where A_p is the probability of the carer C_r to be abusive to, t_i the time the carer C_r spends in the *ith* caring situation, n_{ci} the amount of carers in the *i*th caring situation, a the age of the child, F is a function, D_a the deterrence from abuse to take place and M_a the motivation for abuse to take place, s_n the strength of the support network, a_c the ability of the child, m_a the mental health of the caretaker, p_{ct} the parenting skills of the caretaker and d_t the strength of deterrence of the caretaker.

Note, the parenting skills component is a combination of intellectual and practical parenting skills, and might be written as:

$$p_s = P_s + I_s \tag{9}$$

where p_s are the parenting skills, P_s the practical skills and I_s the intellectual skills.

4.7 The Intensity of abuse

Interesting is to note that the probability for abuse to take place is not the only aspect which is of importance, but the intensity of abuse as well. The question hence is how such intensity can be

measured. Here, the author proposes to take the motivational and a deterrence components into consideration. The following expression will be suggested:

$$I_a = \frac{M_a}{D_a} \tag{10}$$

where I_a is the intensity of the abuse, M_a the motivation to be abusive and D_a the deterrence from abuse

This is, the higher the deterrence is, the smaller is the intensity of abuse (more intense abuse implies harder punishment and hence higher deterrence decreases the intensity). On the other hand, an increased motivation will increase the intensity as the criminal gain is increased.

In terms of intervention, both aspects ought to be taken into account. This is, the probability for abuse to take place and the intensity of this abuse. In case $M_a = D_a$ the intensity will be 1. Intensities above 1 indicate that the question whether abuse is going to take place depends on the age of the child and the caring situation only.

4.8 Theoretical Evaluation of the Model

In order to establish the potential validity and reliability of the model, we consider a number of theoretical scenarios:

Scenario 1: Carer C_r has no access to the child, hence all t_i are 0, hence $A_p = 0$.

Scenario 2: The child reaches the age of 18 and hence turns into an adult: 18/18 = 1 and hence: $A_p = 0$

Scenario 3: The carer C_r spends time with the child only in the presence of a large number of other carers, hence $1/n_i$ approaches 0 and hence: $A_p \rightarrow 0$

Scenario 4: A depressive carer with a strong motivation to abuse but who suffers from paranoia at the same time resulting in a strong deterrence, will not abuse a child, hence: $A_p = 0$

Scenario 5: A narcissist who brings up a child exclusively alone will abuse this child with certainty when the child is new born. Hence: $A_p = 1$. However, the probability decreases as the child gets older with the chance of abuse taking place being reduced to 0.5 by the time the child is about 16 years old.

These five theoretical examples appear to support, so the author argues, the probabilistic model as developed above strongly.

5 Outlook and future research

As much as there seems to exist theoretical validity for the probabilistical model of child abuse there exists no overall empirical evidence as yet. True, that the model has been been fashioned against the background of empirical evidence (e.g. the age component) but as it stands it remains a theoretical construct which simply does not conflict with existing evidence (it has not been faslsified).

Hence, the most urgent area for future research of this model would be the development of suitable instruments which can measure aspects such as mental health, parenting skills etc. in the context of child abuse. This is, as much as there are great number of instruments available measuring aspects

of mental health, there does not exist one, which contains just the crucial subscales which are concerned with child abuse. To give an example: Wiehe (2003) found that abusers are significantly different compared to non-abusers along the narcissistic hypersensitivity scale. However, other subscales such a vanity did not produce any differences. In fact hypersensitivity was the strongest difference between abusers and non-abusers and might be sufficient with a slightly modified Edinburgher Post Natal Depression Scale (addressing ante natal depression as well) to measure the mental health of a carer in the context of child abuse. Additionally to this, subscales measuring intellectual parenting skills, the subjective strength of the support network and the subjective ability of the child (e.g. “Do you find your child is more demanding than other children?”) are of importance as well as the deterrence factor. Such an instrument would have to be checked for internal consistency and external reliability through comparison with observational data and measured data. Facing the fact that such an instrument is not to contain too many items, we can conclude that the development of such an instrument will require much research effort.

Once such an instrument is available and normed, data can be imputed into the probabilistic model. This is where the value of the model could become most obvious. An abuse threshold could be determined by imputing the data of caretakers who have been reported abusive and critical probabilistic values could be established indicating when a caring situation requires intervention.

Further, the model delivers information about the nature of the intervention. For instance, a caretaker who suffers from post natal depression can be helped along several dimensions such as reducing the time the caretaker spends with the child (“care free break”), support through visitation and counselling. On the other side of the spectrum, we might be confronted with a narcissistic personality where quite possibly the most important factor is deterrence. Wherever a component of the model presents a high risk other components have to be manipulated so as to decrease the risk. The probabilistic model, as stated above might just deliver the required information.

6 Conclusion

This paper set out to determine the factors which lead to child abuse. This was achieved by scanning the existing literature and by occasionally making theoretical assumptions. The main factors which lead to child abuse were identified to be the age, ability and accessibility to the child together with the mental health of the caretaker, the amount of caretakers involved, the strength of the support system, parenting skills and the strength of deterrence. These factors then were combined in order to present a probabilistic model of child abuse. This paper made it clear that although a theoretical model can be formulated, its use will heavily depend on the development of an instrument which measures the subscales as indicated above.

The advantage of this model is twofold. Firstly, it can be used to calculate a threshold level of abuse requiring intervention and secondly that it can provide information about how to improve the caring situation for the child.

The paper also claimed that, in order to asses the risk of child abuse parents need to be observed along the subscale practical parenting skills.

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