

## An Ethological Approach to Self-Injury

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An ethological orientation towards self-injury may lead the psychiatrist to examine this aspect of human behaviour in a wider phylogenetic context than is usual in psychiatric formulations. Such observations may eventually lead to a sociobiological understanding of the behaviour. A sociobiological approach examines both proximate causes, which describe the environmental and physiological conditions which trigger a response in an organism, and ultimate causes which are the factors leading to the evolution of the response (Wilson, 1975). In this paper we will show that man and other animals have proximate causes for self-injury in common. This in turn suggests that biochemical and possibly genetic causes may be similarly held in common. From a practical point of view it implies that there may be a common set of features to self-injury which cut across the traditional psychiatric diagnostic classifications and aetiological approaches.

### Self-injury in animals

Self-injury has been reported in non-human species including macaques, marmosets, squirrel monkeys, leopards, lions, jackals, hyenas, rodents and opossums (Jones, 1982). Severe self-injury is often preceded by confinement of the animal and occurs when it is in a high state of arousal. In the macaque the injury may be inflicted by teeth or claws, by gashing the limbs, trunk and scrotum and biting accessible areas of the body. Other, milder, forms of self-injury including persistent scratching are also seen in animals other than man. These may have different antecedents.

### Developmental factors in non-human self-injury

Anderson & Chamove (1985) reported four experiments investigating the conditions responsible for self-aggressive behaviour in macaques. Their results indicate that self-aggression develops early in life in response to physical isolation. Separation in the first two months of life was sufficient to cause self-aggression at a later age, but later experiences could influence this relationship. In particular, pairing with their mother after the separation was more

effective in reducing the rate of self-aggression than pairing with other infants.

### Conditions predisposing non-humans to self-injury

Severe self-injury may be seen in isolates when aggressive behaviour is provoked (Zuckermann, 1932), particularly if the consummation of aggression is denied (Cross & Harlow, 1965). Allyn *et al* (1976) report a case study in which severe self-injury in a macaque was provoked by threatening the animal when it could not escape and was able to but did not attack the handler, suggesting that the animal could inhibit the aggression against the handler and direct it at itself. Self-injury in these situations is often termed self-fighting since it is accompanied by gestures normally seen in an agonistic context. Pond & Rush (1983) report the occurrence of spontaneous self-aggression in five rhesus monkeys, the injuries including self-clasping, self-slapping, self-rubbing and threatening body parts. The injury was generally associated with stressful or stimulating events such as cage changing, changes in room population, attention being given to other monkeys or escape of other monkeys from their cages.

### Redirected social aggression and self-injury

Chamove *et al* (1984) suggested that self-aggression is redirected social aggression. They tested the effect of changes in conditions on an isolated monkey: separation by an opaque partition, placing a novel object with flashing lights close to the isolated animal and 'frustration' by placing an orange segment just out of its reach. Simply isolating the monkey resulted in a significant increase in self-aggression while both the novel object and 'frustration' tests caused a further significant increase. Tinkelpaugh (1928) reported self-injury in association with disturbed sexual bonding while Sackett (1968) implicates failed copulation. DeMonte *et al* (1992) reported that self-aggression was increased if the animal could see another being tested on a memory task and that isolated subjects showed more self-aggression when they observed other monkeys receiving food 'treats' from the

caretaker than did animals which were with a partner when observing the same behaviour.

#### A model of self-injurious behaviour

Using the above evidence a model, presented in Fig. 1, can be constructed. At various levels of the model different conditions or situations prevail. If the appropriate combination of conditions is present in a particular individual then self-injury may result. There is an implicit assumption in both the human and non-human models that a predis-

position toward social aggression is a vital part of the behavioural repertoire of many biologically successful species. Self-injury may occur when the more usual avenues of expression are denied or this aggressive disposition is increased. Developmentally, while there is reasonably strong evidence that animals reared in isolation show a greater level of self-injurious behaviour than those reared in non-isolated situations, self-injury is not seen exclusively in isolates. The immediate social situation in which the animal is placed is capable of modification and hence the disposition to self-injury may be modified.

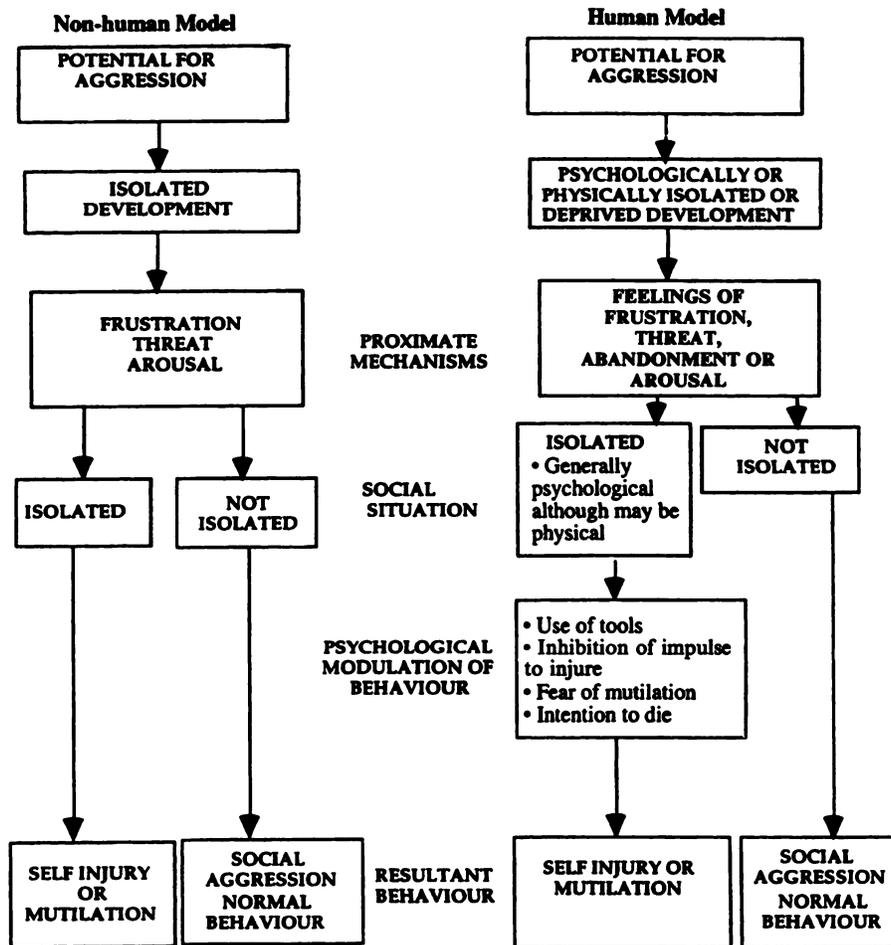


Fig. 1 A model of self-injury applicable to human and non-human behaviour.

**Application of the model to human self-injury**

In humans, any explanatory theory must encompass thinking and feeling. We propose that, in man, thought and affect are the psychological counterparts of the proximate causes found in other animals. For example, behavioural arousal observed in animals has its human analogue in agitation or anxiety while the accompanying frustration and rage have similar counterparts in man. The human analogue of intra-specific aggression is anger against others, whether or not this extends to action, while the developmental factors reported in macaques of infantile isolation and deprivation may be essentially similar in humans or may consist solely of feelings of isolation.

**Human aggression and self-injury**

Inhibition of normal outlets to aggression resulting in self-injury can be seen when there are physical barriers to the expression of aggression, for example, in Soviet prisons (Yaroshevsky, 1975). Feldman (1988) reports that high rates of self-injury are observed in institutional populations among violent and antisocial youths and violent in-patients, a situation in which there may be both physical and non-physical barriers to social aggression.

**Analogues of physical isolation during human development**

Inadequate parenting, particularly maternal deprivation which may be understood as related to isolation, is a commonly reported antecedent of self-injury in humans. Self-injurers have described their mothers as cold and distant (Simpson, 1976). Carroll *et al* (1980) compared the self-reported childhood experiences of adult self-mutilating patients with those reported by non-mutilating patients from the same psychiatric population. The self-mutilators had a significantly higher frequency of separation, violence in their family, physical abuse by their parents and sexual abuse. In total, all but one of the group of self-mutilating patients in their study had been physically or sexually abused as children. Favazza & Conterio (1989) report that, of a sample of 240 female habitual self-mutilators, 54% described their childhood as miserable and 62% report childhood abuse.

The analogies here are not of physical isolation states directly but rather of the cognitions and affects elicited by the analogous experiences in humans and non-humans. We suggest that while the humans may not be physically isolated the feelings of isolation and abandonment which arise

from experiences of separation from parents, abuse and violence are similar to those experienced by individuals of other species which have been physically isolated.

**Immediate behavioural and affective antecedents of self-injury**

The evidence for states of high behavioural arousal prior to a self-injurious act in humans is strong. Simpson (1976) reported that the circumstances of self-cutting are "almost stereotyped and many authors' descriptions show striking agreement". The major precipitant is an experience or threat of loss or abandonment or an impasse in interpersonal relations. The most common associated emotion is unbearable tension; the patient cuts, often painlessly, and the tension is relieved. The patient may report other evidence of high arousal, for example, feelings of depersonalisation before the cutting, with the cutting leading to its cessation.

Feldman (1988) reported that feelings of rage are associated with self-injury in abused children and adolescents and that frustration also plays a role in the occurrence of self-injury in institutionalised populations. In adults the precipitants may be more complex with inability to attain a desired goal being a more relevant antecedent. Further, an individual may be unable to identify the source of a threat or frustration, making direction of aggression toward the source impossible and causing redirection toward the self.

**Social isolation and its cognitive analogue**

Rarely are humans totally physically isolated, when they are, as in the case of political prisoners (Yaroshevsky, 1975), self-injury and suicide are common. This proposition is supported by data from civil prisons (Gunn & Taylor, 1993). A history of social isolation is much more common than a history of physical isolation in self-injurious states in man, as detailed by Simpson (1976). In these human examples there is likely always to be a cognitive component. The human analogue of separation or isolation is, we propose, thoughts of separation or isolation; occurring with or independent of physical isolation, or it may refer to the quality of that isolation, i.e. isolated from specific desired persons or situations.

**Cognitive factors influencing type and extent of injury**

Different species use different gestures determined by their anatomy. Cognitive processes further determine which tools may be used. Higher levels of cognition such as fear of physical disfigurement

are likely to influence the site of injury, possibly its lethality and, at an even more sophisticated level, likely to influence the act itself by consideration of its effect on others.

#### Biological correlates of self-injury

Winchel & Stanley (1991) summarise studies of neurotransmitter abnormalities associated with self-injury. In the Lesch–Nyhan syndrome it may be related to dopaminergic stimulation in a state of receptor supersensitivity although the nature of the link is not clear. There is more support for the hypothesis that self-injury is linked to low serotonin levels. Levels of 5-hydroxyindoleacetic acid (5-HIAA) in cerebrospinal fluid (CSF) have been shown to be a reliable index of serotonin levels in the brain. Low levels of CSF 5-HIAA have been linked, in different studies, to self-injury in depressed patients, suicide attempts, aggressive behaviour, and impulsive violent and non-violent behaviour (Winchel & Stanley, 1991).

Feldman (1988) lists a number of organic syndromes in which self-mutilation may occur. These are: Lesch–Nyhan syndrome, Cornelia de Lange syndrome, Rett syndrome, familial dysautonomia, chronic encephalitis, neurosyphilis, simple mental retardation, mental retardation with pituitary hormone deficiencies, 49XXXXY syndrome, 47XXY syndrome, congenital analgesia/agnosia, sensory isolation (deaf/blind) states, Tourette's disorder, temporal lobe epilepsy, dementia and adrenocortical insufficiency.

Specific organic states or biochemical abnormalities associated with self-injury can be considered as factors which may predispose an individual to self-injury. There may be a common neurochemical substrate for the behaviour across different disorders.

#### A spectrum of self-injury syndromes

Self-injury occurs in various psychiatric syndromes including borderline personality disorder, schizophrenia, Munchausen's syndrome, factitious disorder, the metabolic disorders listed above, in association with rubella encephalitis and in trichotillomania. It is associated with depression and may culminate in suicide. It is found among normal subjects in exotic communities, as part of rituals and in subnormal subjects particularly as head banging. It is argued that these syndromes share, in varying degrees, the following axes and that differing emphasis on the axes and other intervening variables determine the differences between the syndromes.

- (a) Axis I: Specific neuropathology
- (b) Axis II: Physical or psychological isolation during development
- (c) Axis III: A physiological state of high arousal with rage, frustration or isolation or psychological constructs representing these behavioural states.

In the case of attempted suicide, neuropathology (axis I) is not necessarily present but axes II and III generally are. Hawton & Catalan (1987) identify feelings of hopelessness and relationship or separation worries as being common in patients who attempt suicide. They also report that adolescents attempting suicide come from 'broken homes' or otherwise disrupted development far more frequently than the general population. In self-cutters we have already seen Simpson's (1976) description of self-cutting showing the agitation and feelings of separation of axis III while Carroll *et al* (1980) provides the evidence of developmental separation and disturbance required by axis II.

In mental retardation the neuropathological basis of axis I and the developmental disturbance of axis II are often both present. Munchausen's syndrome, while traditionally understood in terms of dissimulation may have similar antecedents, the dissimulation being a superimposed cognitive process. Sussman (1989) states that developmental histories of patients with factitious illnesses are frequently marked by parental neglect, abuse or abandonment, satisfying axis II.

#### Implications for treatment

This model highlights a number of options for the treatment of self-injury. While it is too late to alter the early development of the patient at the time they injure, intervention could be made at other levels. Cognitive or behavioural techniques may be used to provide alternative responses to separation or feelings of loss and provide mechanisms for reducing high levels of arousal, coping with frustration and for redirecting aggression other than toward the self.

This approach is compatible with some existing cognitive treatment techniques. Some of the human analogues of animal states can be formulated as cognitive schemata. For example, Freeman & Leaf (1989) report that schemata such as "I will eventually be abandoned", "My pain [psychic] is so intense that I cannot bear it", "My anger controls me; I cannot modulate my behaviour" and "My feelings overwhelm me; I cannot modulate my feelings" are associated with borderline personality disorders, which is in turn related to self-injury.

Cognitive therapy techniques already exist which are based on modifying these schemata and the present article suggests a theoretical basis for their use in the treatment of self-injury.

### Conclusions

The model of self-injury outlined in this paper and the identification of parallels between human and non-human self-injury provide specific suggestions for future scientific and clinical work. The major benefit of this model is that it provides a framework for future research in humans and non-humans. It posits clear relationships between self-injury and the redirection of social aggression when restraints are imposed on its expression. Inclusion of both animal and human data in the construction of the model means that future research could be based upon animal models, or on clinical intervention of human self-injury. The proposal of a self-injury spectrum suggests that similar interventions may be useful in the treatment of self-injury in otherwise disparate disorders.

#### Clinical implications

- Identifies potential animal models for the aetiology and treatment of self-injury.
- Spectrum concept may allow self-injury to be approached independently of particular disease syndromes.
- Structured model highlights particular sites for treatment interventions.

#### Limitations

- Animal data is limited.
- Difficulty in making direct inferences between humans and animals with respect to thoughts and feelings.
- Conceptual framework differs from traditional psychiatric ones.

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