# Understanding and Treating Self-Injurious Behavior

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Self-injurious behavior is one of the most devastating behaviors exhibited by people with developmental disabilities. The most common forms of these behaviors include: head-banging, hand-biting, and excessive self-rubbing and scratching. There are many possible reasons why a person may engage in self-injurious behavior, ranging from biochemical to the social environment. This paper will discuss many of the causes of self-injury and will describe interventions based on the underlying cause.

## Functionalanalysis

Initially, a functional analysis should be conducted in order to obtain a detailed description of the person's self-injurious behavior and to determine possible relationships between the behavior and his/her physical and social environment (see Wacker, Northup & Lambert, 1997). The information obtained from a functional analysis should include: Who was present? What happened before, during and after the behavior? When did it happen? Where did it happen? Hopefully, the answers to these questions may help reveal the reason(s) for the behavior.

Prior to data collection, it is important to define the behavior of interest. The focus of the functional analysis should be on a specific behavior (e.g., wrist-biting) rather than a behavior category (e.g., self-injury). Combining several types of self-injury into one general behavior may make it difficult to determine different reasons for each behavior. For example, if a child engages in wrist-biting and excessive self-scratching, there may be different a reason for each behavior (see Edelson, Taubman and Lovaas, 1983). Wrist-biting may be a reaction to frustration, whereas excessive scratching may be a means of self-stimulation.

During data collection, salient characteristics of the self-injurious behavior should be recorded, such as the frequency, duration, and severity. Data collection should also include information about the person's physical and social environment. The physical environment should include: the setting (e.g., classroom, cafeteria, playground), lighting (natural light, florescent, incandescent), and sounds (e.g., lawn mower, another child screaming). The names (or codes) of everyone in the person's environment should also be recorded, such as teachers, parents, staff, visitors and students/clients. Other factors to be recorded are: time of day and day of the week.

## PhysiologicalReasonsforSelf-InjuriousBehavior

### Biochemical

Some researchers have suggested that the levels of certain neurotransmitters are associated with self-injurious behavior. Beta-endorphins are endogenous opiate-like substances in the brain, and self-injury may increase the production and/or the release of endorphins. As a result, the individual experiences an anesthesia-like effect and, ostensibly, he/she does not feel any pain while engaging in the behavior (Sandman et al., 1983). Furthermore, the release of endorphins may provide the individual with a euphoric-like feeling. Support for this explanation comes from studies in which drugs that block the binding at opiate receptor sites (e.g., naltrexone and naloxone) can successfully reduce self-injury (Herman et al., 1989).

Research on laboratory animals as well as research on administering drugs to human subjects has indicated that low levels of serotonin or high levels of dopamine are associated with self-injury (DiChiara et al., 1971; Mueller & Nyhan, 1982). In a study on a heterogeneous population of mentally retarded individuals, Greenberg and Coleman (1976) administered drugs, such as reserpine and chlorpromazine, to reduce serotonin levels. These researchers observed a dramatic increase in both aggressive and self-aggressive behavior. Drugs that elevate dopamine levels, such as amphetamines and apomorphine, have been shown to initiate self-injurious behavior (Mueller & Nyhan, 1982; Mueller et al., 1982).

Interestingly, Coleman (1994) studied a group of autistic children who had low levels of calcium (i.e., hypocalcinuria). These individuals often exhibited eye-poking behavior. When given calcium supplements, the eye-poking decreased substantially. In addition, language functioning improved.

What to look for. When self-injury is associated with a biochemical abnormality, there may be little or no relationship between the person's physical/social environment and self-injury. Thus, the behavior may occur in various settings and around different people. However, self-injury may occur less frequently in situations in which the person's behavior is incompatible with self-injury, such as eating, playing, and working on a task.

Intervention. Nutritional and medical interventions can be implemented to normalize the person's biochemistry; this, in turn, may reduce the severe behavior. Although drugs are often used to increase serotonin levels or to decrease dopamine levels, the Autism Research Institute in San Diego has received reports from thousands of parents who have given their son/daughter vitamin B6, calcium and/or DMG. These parents often observed rather dramatic reductions in, and, in some cases, elimination of self-injurious behavior. Parents have also reported reductions in severe behavior problems soon after placing their child on a restricted diet, such as a gluten/casein-free diet, or removing specific foods to which their child showed signs of an allergic reaction.

Seizures

Self-injurious behavior has also been associated with seizure activity in the frontal and temporal lobes (Gedye, 1989; Gedye, 1992). Behaviors often associated with seizure activity include: head banging, slapping ears and/or head, hand-biting, chin hitting, scratching face or arms, and, in some cases, knee-

to-face contact. Since this behavior is involuntary, some of these individuals seek some form of self-restraint (e.g., having their arms tied down). Seizures may begin, or are more noticeable, when the child reaches puberty, possibly due to hormonal changes in the body.

What to look for. Since seizure-induced, self-injurious behaviors are involuntary, one may not observe a relationship between the person's behavior and his/her environment. However, since stress can trigger a seizure, there may be a relationship between stressors in the environment and self-injury. This may include too much physical stimulation (e.g., lighting, noise) and/or social stimulation (e.g., reprimands, demands). Foods may also induce seizures (Rapp, 1991). If the behavior began or got worse during puberty, one may also consider the possibility of seizure activity. If seizures are suspected, it is recommended that the person have an EEG.

Intervention. Although drugs are used to control seizure activity, they are often associated with adverse side effects. There is evidence that DMG will reduce seizure activity without negative side effects (Roach & Carlin, 1982).

Genetic

Self-injurious behavior is also common among several genetic disorders, including Lesch-Nyhan Syndrome, Fragile X Syndrome, and Cornelia de Lange Syndrome. Since these genetic disorders are associated with some form of structural damage and/or biochemical dysfunction, these abnormalities may cause the person to self-injure.

What to look for. Those individuals with Lesch-Nyhan Syndrome often bite around the mouth area and their fingers; those with Fragile X Syndrome often engage in self-biting (including lips and fingers); and those with Cornelia de Lange Syndrome often engage in self-biting and face hitting.

Interventions. Biochemical interventions, such as nutritional supplements and drugs, appear to be the treatment of choice for these individuals. It is also possible that other interventions discussed in this paper may help these individuals. For example, behavior modification may teach the person to inhibit these behaviors.

Arousal

It has often been suggested that a person's level of arousal is associated with self-injurious behavior. Researchers have suggested that self-injury may increase or decrease one's arousal level. The under-arousal theory states that some individuals function at a low level of arousal and engage in self-injury to increase their arousal level (Edelson, 1984; Baumeister & Rollings, 1976). In this case, self-injury would be considered an extreme form of self-stimulation. In contrast, the over-arousal theory states that some individuals function at a very high level of arousal (e.g., tension, anxiety) and engage in self-injury to

reduce their arousal level. That is, the behavior may act as a release of tension and/or anxiety. High arousal levels may be a result of an internal, physiological dysfunction and/or may be triggered by a very stimulating environment. A reduction in arousal may be positively reinforcing, and thus, the client may engage in self-injury more often when encountering arousal-producing stimuli (Romanczyk, 1986).

What to look for. With respect to under-arousal, self-injury would be observed when the person is bored and/or is not involved in stimulating activities. With respect to over-arousal, self-injury would be observed in arousal-inducing situations, such as an especially noisy or brightly lighted room. Social interaction may also be perceived as very stimulating.

Intervention. If the person is under-aroused, an increase in activity level may be helpful. For example, an exercise program can be implemented (e.g., stationary bicycle). If the person is over-aroused, it is recommended that steps be taken, usually before the behavior begins, to reduce his/her arousal level. This may include: relaxation techniques (Cautela & Groden, 1978), deep pressure (Edelson et al. 1998), vestibular stimulation (King, 1991), and/or removing the person from a stimulating situation. Exercise may also be used to reduce arousal level.

Pain

Another reason why an individual may engage in head banging is to reduce pain such as pain from a middle ear infection or a migraine headache (de Lissovoy, 1963; Gualtieri, 1989). There is growing evidence that pain associated with gastrointestinal problems, such as acid reflux and gas, may be associated with self-injury. In addition, some autistic individuals report that certain sounds, such as a baby crying or a vacuum cleaner, can cause pain. In all of these instances, self-injury may release beta-endorphins which would dampen the pain. Conversely, these individuals may be 'gating' the pain. In this case, stimulating one area of the body (in this case by injuring oneself) may reduce or dampen the pain located in another area of the body.

What to look for. Self-injury behavior may occur sporadically. The person may show signs of illness or appear to be in pain on those days he/she exhibits self-injury. The person's family history should be checked to see if migraines run in the family. If possible, the person should have his/her ears examined and body temperature measured to check for a middle ear infection.

Intervention. Consumption of dairy products are often associated with middle ear infections in many children. Certain foods in the person's diet may be responsible for migraines. Additionally, magnesium deficiency is associated with an increase in sound sensitivity. Magnesium supplements are safe and can reduce sound sensitivity in some individuals. The recommended dosage is 3 to 4 milligrams per 10 pounds a day. Auditory integration training has also been shown to reduce sound sensitivity (Rimland & Edelson, 1994).

### Sensory

Excessive self-rubbing or scratching may be an extreme form of self-stimulation. The person may not feel normal levels of physical stimulation; and as a result, he/she damages the skin in order to receive stimulation or increase arousal (Edelson, 1984).

What to look for. The person appears to be insensitive to pain and possibly touch. The behavior may decrease when the person is busy (e.g., playing, working on a task) because his/her attention is directed away from his/her body.

Intervention. The person may be encouraged to apply safe forms of physical stimulation to those parts of the body which he/she rubs and/or scratches excessively. This could include applying a massaging vibrator, rubbing textured objects against the skin (such as uncooked beans or macaroni), and rubbing a brush against the skin. There is also evidence that placing a topical anesthetic on the self-injured area may reduce the behavior.

### Frustration

Caretakers and parents often report that the child's self-injury is a result of frustration. This is consistent with the traditional Frustration è Aggression model proposed by Dollard and his colleagues (1939). Commonly reported scenarios include: a person with poor communication skills becomes frustrated because of his/her lack of understanding of what was said to him/her (poor receptive communication) or because the caretaker does not understand what is said/requested; or an individual who has good communication skills but does not get what he/she wants. These reasons are discussed more in the next section.

## SocialCauses

### Communication

Communication problems have often been associated with self-injurious behavior. If a person has poor receptive and/or has poor expressive language skills, then this may lead to frustration and escalate into self-injury.

What to look for. If the person has poor receptive skills, communication may be the problem if the behavior occurs after someone says something to him/her. Additionally, if a person has poor expressive skills, self-injurious behavior may occur after he/she tries to communicate, perhaps by gesture; and the caretaker does not understand or does not respond appropriately.

Intervention. With respect to expressive language, these individuals should be taught functional communication skills (Dyer & Larsson, 1997). With respect to receptive communication skills, the

person may be chronically ill (e.g., constant headache, nausea) and may not be able to clearly focus his/her attention to what was said. This may be due to sensitivity to certain food items. In addition, there is evidence that auditory integration training (AIT) may improve receptive language skills as a result of better retrieval of information from long-term memory (Edelson et al., 1999).

## Social Attention

A great deal of research has investigated social contingencies of self-injury. Lovaas and his colleagues were able to control the frequency of self-injury by manipulating social consequences (Lovaas et al., 1965; Lovaas & Simmons, 1969). Basically, positive attention can increase the frequency of self-injury (i.e., positive reinforcement), whereas ignoring the behavior can decrease the frequency (i.e., extinction).

What to look for. Following an episode of self-injury, observe if/how the caretaker attends to the individual. This attention may be positive (e.g., "What do you want?") or negative ("Don't do that"). Note that the individual may interpret a negative comment in a positive manner; and consequently, the behavior may still be positively reinforced.

Interventions. If the person tends to receive attention following the behavior, especially if the attention is positive, then the caretaker should do his/her best to ignore the behavior. If this is not possible because the person may injure him-/herself, then the caretaker should minimize contact with the individual while displaying little facial expression (neither approving nor disapproving).

Consistency is very important because the behavior will continue if the individual receives intermittent reinforcement (i.e., attention) for the behavior. In fact, the behavior will be stronger and more resistant to extinction if intermittently reinforced. Since these individuals seek attention, which is quite normal for most people, they should receive attention, but it should not be contingent on self-injury. For example, the caretaker should give the person attention when he/she does not engage in self-injury (e.g., positive attention following 10 minutes without an episode of self-injury). There are numerous contingency strategies and schedules that can be implemented to provide attention to the individual (e.g., DRO--differential reinforcement of other behaviors).

## Obtain Tangibles

Another reason why an individual may engage in self-injurious behavior is to obtain an object or event (Durand 1986; Durand & Cremmins, 1988). For instance, an individual may request something, not receive it, and then engage in self-injurious behavior. Additionally, the behavior may be reinforced positively if the individual should, on occasion, receive the desired object or event. A survey by Maisto et al. (1978) reported that 33% of the clients engaged in self-injury because "they wanted something."

What to look for. Self-injury will typically occur after he/she requests something and does not get it. The person occasionally does get what he/she wants during or soon after engaging in self-injury.

Interventions. In this situation, the person's caretakers should not give anything to the person during or following an episode of self-injury. Consistency is also important because the behavior will continue even if the individual 'gets what he wants' on only some occasions. (See previous discussion on intermittent reinforcement.) A behavioral program can also be set up to allow the person to make requests to obtain what he/she wants, but this should occur in a controlled, systematic and non-violent manner (e.g., giving the person options at specific times of the day).

## Avoidance/Escape

Some individuals engage in self-injury to avoid or escape an 'aversive' social encounter (Carr et al., 1976; Edelson et al., 1983). The individual may engage in self-injury just prior to the social interaction; and thus, he/she may avoid the social interaction before it begins. Alternatively, the individual may engage in self-injury to escape (or terminate) a social encounter that has already begun. For example, a caretaker may ask a client to do something (e.g., to leave the play area); and if the person does not want to comply, he or she may then engage in self-injury. As a consequence, the caretaker's initial request is dropped or forgotten, and the caretaker's attention is then directed at stopping the behavior.

What to look for. In an 'avoidance' situation, the person may begin to self-injure soon after someone enters the room or approaches the person. In an 'escape' situation, the person may begin to self-injure during a social encounter. The caretaker's requests (or demands) are often abandoned soon after the person engages in self-injury.

Interventions. In this situation, it is important that the caretaker 'follows-through' with his/her requests or demands placed on the individual. If the person should engage in self-injury, the caretaker can continue to make the requests during the behavior; or the caretaker may direct his/her attention to stop the behavior but then present the request again until the individual complies.

## Concluding Remarks

It is important to understand that there are different reasons why individuals engage in self-injurious behavior. Edelson et al. (1983) observed three different forms of self-injury by the same individual. This client was observed for a total of five hours, and all antecedents and consequences of self-injury were recorded. The client banged his head against his knee and then received attention; pinched his stomach after the staff asked him to do something; and bit his wrist after he asked for something but did not receive it.

It is also possible that one form of self-injury may serve more than one function. For example, a person may engage in wrist-biting when he is unable to communicate his needs and when he does not get what he wants.

When conducting a functional analysis, the underlying reason for the self-injurious behavior may not be obvious in some cases. Based on observational data, the possible reasons for the behavior should be ranked ordered, from most likely to least likely. This rank ordering can then determine the order in which different interventions are implemented.

Research has also shown that aversives (i.e., punishment) may effectively reduce or eliminate self-injurious behavior by training the person to inhibit his/her behavior. If the behavior is severe and if numerous attempts have failed to reduce the behavior, then one may consider using an aversive to stop the behavior. Visual screening (i.e., placing a cloth or piece of white paper in front of the person's face) has been shown to be rather effective in reducing severe behaviors, such as self-injury and aggression (Jones et al. 1991). Other forms of aversives include: squirting lemon juice in the mouth, spraying the person's face with a water mist, tilting the person backwards, and in some cases, using a mild electric shock. Great care should be taken when using an aversive strategy. For example, inconsistency should be avoided, generalization across different settings and caretakers should take place, and built-in safe-guards to protect against possible abuse should be incorporated.

By carefully examining a person's behavior, one can make a reasonable deduction regarding the appropriate intervention. This strategy is much better than relying on 'trial and error.' Finally, it is important to have a positive outlook when trying to understand and treat this behavior. Behavior, even self-injurious behavior, can usually be controlled in most situations.

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