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Descriptive Analysis of Self-injurious Behaviour and Self-restraint

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### Abstract

Self-restraint often appears to be associated with self-injurious behaviour (SIB) and has been described as an attempt to prevent or escape from SIB. Research into the determinants of self-restraint is limited and this single case study assesses the environmental determinants of self-restraint and SIB and describes the relationship between the two behaviours. Observations in the natural environment were conducted for 16.5 hours and data were collected on SIB, self-restraint and environmental events. Sequential analysis showed that SIB and self-restraint were unrelated to environmental events and that the behaviours co-varied inversely. SIB occurred at higher than chance levels immediately following self-restraint and also at high levels immediately prior to self-restraint. Whilst these results would appear to support the hypothesis that self-restraint was negatively reinforced by escape from SIB, the data cannot be explained solely by this theory. The implications of these findings for the behavioural theory of SIB and the conceptualisation of self-restraint are discussed.

Keywords: Self-injury, self-restraint, descriptive analysis

### **Introduction**

Estimates from prevalence studies suggest that approximately 12 to 50% of individuals with intellectual disabilities who engage in SIB also engage in self-restraint (Powell et al. 1996, Rojahn et al. 1978). Self-restraint has been defined as “the habit of some self-injurers to seek physical restraint devices, to entangle their legs and arms in clothing or furniture or lie on their arms as a means of restraining themselves from self-injury” (Schroeder & Luiselli 1992 p.293). A diverse range of topographies of self-restraint have been reported in the literature including; entanglement of limbs in furniture or clothing (Peterson & Peterson 1968, Powell et al. 1996), restriction of one body part by another e.g. folding hands (Rojahn et al. 1978), requesting or self positioning in physical restraints (Baroff & Tate 1968), wearing particular items e.g. glasses (Foxy & Dufrense 1984) and holding particular objects e.g. a cup (Lovaas & Simmons 1969).

The observation that self-restraint and self-injurious behaviours (SIB) are often associated has led some researchers to hypothesise that self-restraint is maintained by escape from or avoidance of SIB (e.g. Baroff & Tate 1968, Rojahn et al. 1978, Smith et al. 1992). Smith et al. (1992) for example conducted an experimental analysis of self-restraint in which restraint was either “available” or “unavailable”. These authors found a negative correlation between self-injury and self-restraint, which is consistent with the escape hypothesis. Other investigators have suggested that SIB and self-restraint may be maintained by the same environmental events. For example, Pace et al. (1986) found both self-restraint and SIB shown by two individuals to be maintained by escape from demands. Other studies have shown that SIB and self-restraint were both maintained by attention (Derby et al. 1996, Peterson & Peterson 1968). Finally, Smith et al. (1992) have suggested that SIB and self-restraint behaviours could be functionally independent responses but nevertheless

environmentally determined. However, no data were provided to support this hypothesis.

To date, no naturalistic studies describing the nature of self-restraint and its relationship to SIB have been conducted. Therefore, this study investigated whether there was an identifiable relationship between self-restraint and self-injury by observing one individual in their natural environment and conducting a sequential analysis of the resulting data. It was hypothesised that if self-restraint was negatively reinforced by escape from SIB, then sequential analysis should reveal high levels of SIB occurring prior to the onset of self-restraint and low levels of SIB occurring during and following self-restraint. If, on the other hand, self-restraint was maintained by escape from demands, then sequential analysis should reveal high levels of demands prior to self-restraint and low levels during and following self-restraint. Finally, if self-restraint was maintained by attention, then sequential analysis should reveal low levels of attention prior to self-restraint and high levels of attention during and following self-restraint.

## **Method**

### Participant

JB was a 26 year-old man with a profound learning disability diagnosed as having Down's Syndrome. He was fully mobile, had no significant physical or sensory impairments and appeared to understand simple words but had no speech. He attended a Social Education Centre during the day. JB had a history of SIB which included face hitting and poking of the thumb to the back of the mouth. He also showed some physical aggression, which consisted of grabbing staff or other service users' arms and

clothing and slamming doors. JB engaged in two forms of self-restraint: either placing a sock over his left hand, and/or trapping his arms in the body of his clothing (e.g. in jumpers and T-shirts).

#### Observational Recording, Response definitions and Inter observer-agreement

Observers collected data on the frequency and duration of each behaviour using an Olivetti Quaderno PC. The software (Repp *et al.* 1989) allows up to 36 behaviours to be simultaneously recorded in real time and thus avoids any form of time sampling. Three participant behaviours were recorded: face-hitting (any rapid contact of the open hand with the face), mouth-poking (any rapid backward and forward movement of the thumb while in the individual's mouth), and self-restraint (any item of clothing being placed on the left hand and covering it fully and/or trapping arm in the body of the clothing being worn).

Three caregiver behaviours were also recorded: denials (any verbal or physical direction initiated by the caregiver towards the client that denies the client access to something e.g. a new activity or an object), demands (any verbal or physical direction by the caregiver in order for the client to initiate or complete an action or a task) and attention (any verbal or physical contact made by the caregiver towards the client, which did not include a denial or demand e.g. talking, offering drinks and food or just speaking to or touching the client).

A second observer independently recorded responses during 13% (2hrs 9min) of the total observation time. Agreement was calculated on a 1-second interval basis using the formula for Kappa (Cohen 1960). The mean Kappa value computed across

behaviours was 0.73 (range, 0.66 to 0.83) indicating that agreement between observers was good.

### Procedure

Observations were conducted for 16.5 hrs in the participant's natural environment (i.e., at the day centre) over a period of three weeks. The majority of observations were made in the sensory room, JB's preferred activity. However a small percentage of observations occurred in the dining room and music room. Care-staff were reassured that the participant's privacy would be respected at all times and that they could ask for the observations to be terminated. The observer (DF) attempted to remain inconspicuous throughout the observations and care-staff were asked to interact with the participant as normally as possible.

### Data Analysis

To describe the temporal association between the different behaviours recorded, a time-based lag sequential analysis procedure was employed (Sackett 1987). Three time "windows" each surrounding the occurrence of each of JB's behaviours were imposed on the data. A prior to time window was defined as any 10-s time period prior to the onset of the behaviour. A during time window included periods of time 5-s after the onset of the behaviour and 5-s prior to the offset of the behaviour. A following time window was defined as 10-s following the offset of the behaviour. (Note that the periods between occurrences of self-restraint averaged 20.48 seconds. However, on some occasions the time between occurrences of self-restraint was less than 10-s. In these cases, the time window was shortened to include only the number of seconds that were available in the data). After the preceding, during and

following periods were defined in this way, for each occurrence of the given behaviour (e.g. self-restraint) the time units at which each target behaviour (e.g. self-injury) co-occurred in each time window were determined. The mean probability of a target behaviour occurring at each second for each period of the given behaviour was then calculated. A summary diagram of the probability of the target behaviour prior to, occurring during and following each given behaviour was then constructed. (c.f. Hall & Oliver 1997).

## Results

Figure 1 shows the percentage of time during which self-restraint occurred and the frequency of mouth-poking and face-hitting across observation hours.

++ Insert Figure1 about here ++

Self-restraint occurred at high levels throughout the duration of the observations (96% of the total observation time) and showed little variability across observation hours. Mouth-poking occurred at lower levels (between 0 to 60 times per hour) and appeared to increase in frequency over the observation period. Face-hitting occurred between 0 and 30 times per hour and showed no apparent trend across observation hours.

Plots showing the relationship between JB's behaviours and care-staff attention, demands and denials using the method described above are presented in Figure 2.

++ Insert Figure 2 about here ++

The figure shows that the probability of attention, demands and denials remained at low levels prior to, during and following mouth-poking, face-hitting and self-restraint. These data indicate that JB's behaviours did not appear to be related to social environmental variables.

To investigate the relationship between self-restraint and SIB, the temporal relationship between JB's mouth-poking, face-hitting and his self-restraint was examined. The data are shown in Figure 3.

++ Insert figure 3 about here ++

The figure shows that there appeared to be a significant relationship between JB's mouth-poking and his self-restraint even though the behaviours were compatible. Here, the probability of mouth-poking increased to about 0.3 preceding self-restraint, occurred at near zero levels during self-restraint and increased to 0.5 immediately following self-restraint and decreased thereafter. Time series analysis (Tryon 1982) indicated that JB's mouth-poking increased significantly prior to self-restraint ( $Z = 2.31, p < 0.01$ ). These data would appear to support the hypothesis that JB's self-restraint may have been maintained by escape from SIB i.e., mouth-poking increased immediately preceding self-restraint and was removed contingent on the occurrence of self-restraint. Interestingly however, SIB also occurred at high levels immediately following self-restraint, with the probability of mouth-poking increasing to 0.5 and decreasing significantly thereafter ( $Z = 2.78, p < 0.01$ ). No association was found between JB's face-hitting and his self-restraint.

To determine the magnitude of the association between JB's self-restraint and mouth-poking, Yule's Q statistics were calculated at each time point displayed in Figure 3 (see Bakeman & Quera 1995). High values for Q at a particular time point (i.e., greater than 0.6) would indicate that mouth-poking was more likely to occur than would be expected by chance. For the relationship between mouth-poking and self-restraint shown in Figure 3, all Yule's Q values at each time point prior to and following self-restraint were greater than 0.6 (range, 0.64 to 0.98 prior to self-restraint and 0.71 to 0.99 following self-restraint). These data indicated that mouth-poking occurred at higher than chance levels both prior to and following the occurrence of self-restraint.

## **Discussion**

Several theories have been advanced concerning the relationship between self-restraint and SIB. Some authors have found self-restraint to be maintained by escape from, or avoidance of SIB (e.g. Baroff & Tate 1968, Rojahn *et al.* 1978, Smith *et al.* 1992). Others have considered self-restraint and SIB to be members of the same response class (Pace *et al.* 1986) or to be functionally independent responses (Smith *et al.* 1992). The results reported here provided no evidence to support the hypothesis that self-restraint was maintained by social environmental events.

A strong statistical association was found between mouth-poking and self-restraint in the periods preceding and following self-restraint, indicating that self-restraint may have functioned as an escape behaviour for the removal of mouth-poking. Interestingly, analysis of the data also indicated high levels of mouth-poking immediately following self-restraint i.e., JB was, in fact, more likely to engage in mouth-poking immediately after he had stopped self-restraining. No relationship was

found between JB's face-hitting and his self-restraint nor between JB's face-hitting and social-environmental events. These data indicate that whilst some forms of SIB may be related to self-restraint, other forms of SIB in a client's repertoire may in fact be unrelated to self-restraint. For JB, the relationship between different forms of SIB and his self-restraint did not arise simply due to physical incompatibility. JB was able to mouth-poke and/or face-hit when he engaged in self-restraint. This can be seen by the fact that mouth-poking and face-hitting occurred at non-zero levels at some of the data points during self-restraint (see Figure 3).

On the surface, the fact that high levels of mouth-poking occurred immediately following JB's self-restraint would appear to run counter to a purely behavioural account of SIB and self-restraint. Why should mouth-poking immediately follow self-restraint? One promising avenue of research that may ultimately shed some light on these data is the acknowledgement by some investigators that biological variables such as anxiety may serve as setting events for problem behaviours. Romancyck *et al.* (1992) for example have suggested that arousal may play a key role in the aetiology of many behaviour disorders. For an individual with a history of restraint (as JB had), Romancyck *et al.* (1992) argue that seeking restraint can be an effective method of arousal reduction and that a reduction in arousal negatively reinforces behaviour that in the past has led to restraint. Perversely, this escape behaviour may in fact be SIB, thus establishing a "vicious cycle" of SIB and self-restraint. Recent advances in the measurement of anxiety described by Freeman *et al.* (1999) may allow the relationship between arousal, SIB and self-restraint to be further understood. A possible explanation for the present data is that JB may have found even short periods of time without self-restraint highly aversive. The absence of self-restraint may thus have acted as an establishing operation, evoking behaviour that in the past had led to

restraint i.e., SIB. JB's SIB may then have been negatively reinforced by his subsequent engagement in self-restraint, promoting the so-called vicious cycle. Given that the results of this analysis are purely correlational, further replication of this phenomenon is clearly warranted using experimental methodology.

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Figure captions

Figure 1. The percentage duration of self-restraint, frequency of mouth-poking, and frequency of face-hitting in each hour of observation.

Figure 2. The probability of attention, demands and denials prior to, during and following mouth-poking, face-hitting, and self-restraint.

Figure 3. The probability of mouth-poking and face-hitting prior to, during and following self-restraint.





