*REDUCING COVERT SELF-INJURIOUS BEHAVIOR MAINTAINED BY
AUTOMATIC REINFORCEMENT THROUGH A VARIABLE
MOMENTARY DRO PROCEDURE*

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Covert self-injurious behavior (i.e., behavior that occurs in the absence of other people) can be difficult to treat. Traditional treatments typically have involved sophisticated methods of observation and often have employed positive punishment procedures. The current study evaluated the effectiveness of a variable momentary differential reinforcement contingency in the treatment of covert self-injury. Neither positive punishment nor extinction was required to produce decreased skin picking.

Key words: covert behavior, self-injury, differential reinforcement of other behavior

The treatment of covert self-injurious behavior (i.e., SIB that occurs in the absence of other people) presents a unique assessment and treatment challenge for therapists and caregivers. Researchers in clinics and hospitals have relied on observation from behind one-way mirrors that are not commonly available in typical settings and have implemented positive punishment contingencies to reduce covert SIB. For instance, Piazza, Hanley, and Fisher (1996) reduced covert cigarette pica by having a therapist enter the room and provide a brief reprimand after each instance of pica observed from behind a one-way mirror. Maglieri, DeLeon, Rodriguez-Catter, and Sevin (2000) reduced the covert food stealing of an individual with Prader-Willi syndrome by delivering reprimands after a session in which food was missing from a baited room.

Differential reinforcement of other behavior (DRO) may provide an effective, appetitive-

based alternative for treating covert SIB. Page, Finney, Parrish, and Iwata (1983) arranged DRO contingencies to reduce the covert food stealing of two individuals with Prader-Willi syndrome by observing from behind an observation window and delivering token reinforcement for periods without food stealing. Grace, Thompson, and Fisher (1996) treated covert self-injurious scratching via DRO by conducting intermittent skin checks and delivering access to reinforcers for the absence of new injuries. This study was notable for its lack of dependence on direct observation, but this product form of measurement may not be sufficient to detect SIB in cases in which each instance of SIB does not leave a product (i.e., low-intensity SIB or SIB directed towards a previously injured area).

A variable momentary DRO (VMDRO) may be uniquely suited to treating covert SIB in settings that are not equipped with covert observation equipment. Unlike typical DRO procedures that arrange reinforcement delivery contingent on the continuous absence of a behavior for a specified interval, VMDRO procedures arrange reinforcement delivery

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contingent on the absence of a behavior at a particular moment (Repp, Barton, & Brulle, 1983). Because the procedure does not necessitate continuous observation, implementers may be able to arrange VMDRO contingencies during brief check-ins. Lindberg, Iwata, Kahng, and DeLeon (1999) demonstrated the efficacy of VMDRO contingencies with extinction at reducing overt SIB maintained by attention. The purpose of the current study was to evaluate a VMDRO contingency without extinction to reduce covert skin picking maintained by automatic reinforcement.

METHOD

Participants and Setting

Kevin was a 12-year-old boy with multiple diagnoses including autism, cerebral palsy, traumatic brain injury, and a genetic disorder involving deletion of Chromosome 6 and duplication of Chromosome 3. His psychologist had referred him to our university clinic for the assessment and treatment of self-injurious skin picking that had resulted in numerous open lesions to his arms, legs, and torso. Kevin spoke in short sentences and required minimal assistance with daily living tasks such as dressing and toileting. Therapists conducted all assessment and treatment sessions in a therapy room equipped with a video camera that allowed observation from an adjacent room.

Measurement and Interobserver Agreement

We defined *skin picking* as Kevin moving his fingertips or fingernails with pressure on his skin or clothing. Observers recorded skin picking using continuous frequency recording during 10-min assessment and treatment sessions. Observers scored a novel instance of skin picking when Kevin (a) paused for greater than 1 s between picks, (b) switched hands, or (c) changed the location of picking on his body or clothing with a distance greater than 3 in. from the previous location. We scored the frequency of skin picks rather than duration, because

Kevin's skin picks were characteristically brief, discrete events. A second observer simultaneously but independently scored the occurrence of skin picking during 55% of functional analysis sessions and 33% of treatment evaluation sessions. To assess interobserver agreement, we partitioned each observer's records into 60 10-s intervals and compared each record on an interval-by-interval basis. We provided each interval in exact agreement a score of 1 and all other intervals a proportional score by dividing the smaller number of instances by the larger number of instances. We then summed each interval's score, divided the sum by the total number of intervals, and converted this score to a percentage. The mean agreement score for skin picking was 91% (range, 65% to 100%) during the functional analysis and 92% (range, 57% to 100%) during the treatment evaluation.

Procedure

Preference assessments. We completed a structured interview (Fisher, Piazza, Bowman, & Amari, 1996) with Kevin's mother to identify an array of preferred leisure items and then conducted a paired-choice preference assessment (Fisher et al., 1992) to identify the most preferred item (access to an animated children's video) to deliver in the VMDRO contingency.

Functional analysis. We conducted a functional analysis of Kevin's skin picking based on the model described by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994), which included attention, escape, control, and ignore sessions alternated in a multielement design. We then alternated alone and ignore sessions to determine if a therapist's presence had a suppressive effect on picking (this functional analysis also appears in Kliebert, Tiger, & Toussaint, in press).

Treatment evaluation. During 10-min baseline sessions, Kevin was alone in the therapy room without access to leisure materials; we did not program any consequences for skin picking. VMDRO sessions were similar except that on a variable schedule, a therapist entered the room

Figure 1. Skin picks per minute during ignore, attention, toy play, and escape conditions of Kevin's initial multielement functional analysis and additional alone and ignore comparisons.

and provided reinforcement in the form of a token and praise (e.g., "Good job not scratching!") contingent on the absence of skin picking at that moment; she then left the room. If skin picking occurred during a check, the therapist exited the room without comment. We were able to observe Kevin's skin picking continuously via the video equipment, but the therapist administered contingencies based on the absence of skin picking only at the moment she entered the room. Kevin exchanged each of his earned tokens for 30-s access to a video following each session or, if he made an independent vocal request, cumulatively at the end of the day.

For each VMDRO session, we calculated five DRO intervals of 50%, 75%, 100%, 125%, and 150% of the mean interresponse time (IRT; see Lindberg et al., 1999). The mean IRT between picks was determined by calculating the mean across the last three baseline sessions (8 s). The VMDRO mean interval for the first VMDRO session then was set at 8 s, and the check-in intervals (i.e., 4 s, 6 s, 8 s, 10 s, and 12 s) were calculated based on this mean. The therapist conducted these checks in a random and counterbalanced order. We then progressively

increased the mean interval duration by 50% after every two consecutive sessions in which skin picking remained below 90% of baseline. If skin picking increased based on visual inspection of the data, we decreased the mean interval to its preceding value.

RESULTS AND DISCUSSION

We observed low and undifferentiated skin picking rates during functional analysis conditions (Figure 1). We then compared skin picking under both ignore and alone conditions to determine if skin picking was more likely to occur in the absence of an observer (we observed all sessions through video surveillance). Kevin engaged in consistently higher levels of skin picking during the alone condition, indicative of the covert nature of this behavior ($M_s = 7.7$ during alone and 1.1 during ignore).

Kevin engaged in a mean of 5.7 picks per minute during the baseline of his treatment evaluation (Figure 2). After implementation of the VMDRO, skin picking immediately reduced to low levels. We gradually faded the mean VMDRO interval to 91 s with low levels of skin picking ($M = 0.4$) prior to implementing a

Figure 2. Rates of skin picking during baseline (BL) and VMDRO conditions. The numbers above each data point indicate the mean VMDRO interval duration (in seconds). The horizontal dashed line depicts the 90% reduction criterion we used for decision making.

reversal. Withdrawal of the VMDRO contingency resulted in increased skin picking ($M = 6.9$); reinstatement of the treatment condition again resulted in a greater than 90% reduction in skin picking ($M = 0.4$) that was maintained as we faded the mean VMDRO interval to 300 s.

In the current evaluation, we reduced high-rate, covert skin picking to near zero via a VMDRO without the use of extinction or positive punishment. Previous research suggests that arranging extinction for problem behavior is typically necessary for differential reinforcement procedures to be effective (Hagopian, Fisher, Sullivan, Acquistio, & LeBlanc, 1998; Mazaleski, Iwata, Vollmer, Zarcone, & Smith, 1993). Instead of extinction, which would have involved attenuating the sensory consequences

of skin picking, we delivered high-preference leisure items contingent on the absence of skin picking; contingent access to these leisure items successfully competed with the automatic reinforcers for self-injury. It is likely that the reinforcing value of leisure items combined with praise was greater than that obtained by engaging in skin picking. Had we not been able to identify such high-preference items, treatment success using a VMDRO would have been less likely. Given the importance of identifying items that will compete successfully with self-injury, future research and application of this procedure may include a competing-items assessment prior to the implementation of differential reinforcement procedures (Fisher, DeLeon, Rodriguez-Catter, & Keeney, 2004).

It is possible that the DRO contingency was unnecessary to obtain the present treatment effects and that intermittent check-ins alone were a sufficient deterrent for skin picking, given the covert nature of this behavior. An alternative control condition to address this possibility would be to maintain a similar check-in schedule during a reversal to baseline without implementing the DRO contingency. Continued suppression under this condition would have indicated the suppressive effect of the therapist's presence (see Athens, Vollmer, Sloman, & St. Peter Pipkin, 2008), and a reemergence of skin picking would have indicated the necessity of the DRO contingency. Future VMDRO research on treating covert behavior should include this control.

Tentatively assuming the beneficial nature of the DRO portion of these procedures, VMDROs provide caregivers with a low-tech means of capturing covert SIB other than relying on permanent behavioral products. Check-ins are less costly than using video equipment or one-way observation mirrors and can be implemented in multiple settings. As mentioned previously, we used video monitoring for evaluation purposes only; we determined the delivery of reinforcement only via the therapist's observations during the VMDRO check. In this regard, the video-monitored observations likely were not essential to implementing contingencies as caregivers would typically implement in home and school settings.

At the completion of the fading schedule, a caregiver initiated a check-in every 300 s (5 min) on average, delivered a praise statement and a token when appropriate, and periodically arranged a token-exchange period. We feel that therapists could reasonably expect integrity with such an intervention by caregivers, such as parents and teachers, in conjunction with their other responsibilities. Teachers in particular are likely to view such a relatively low-effort procedure more favorably than one that requires continuous

monitoring (e.g., whole-interval DRO). Future research may directly assess the social validity of VMDRO contingencies compared to other differential reinforcement procedures.

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