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Investigating the Relationship between Training Type and Treatment Integrity

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In recent years there has been a renewed interest in the assessment of treatment integrity. Current studies have examined means by which to increase treatment integrity but may be limited by an overreliance on indirect measures of treatment integrity and failure to address multiple training methods within one study. The present study was conducted to investigate the relationship between training procedures and treatment integrity. Participants first read a case description and intervention plan for a client (confederate) exhibiting a facial tic. Participants were trained using one of three procedures (didactic, modeling, or rehearsal/feedback) to implement the treatment protocol and then conducted a treatment session with the client. Treatment sessions were coded for accuracy of implementation (integrity). Higher levels of treatment integrity were associated with direct training procedures (i.e., modeling and rehearsal/feedback training). Implications of the results for treatment planning and the potential ramifications for consultants working in the schools are discussed.

Behavior management techniques have been shown to be effective for altering various topographies of behaviors across numerous settings. When attempting to change children's behavior, the adults in the environment must usually alter some aspect of their own behavior to implement the treatment protocol as it was intended. Implementing a treatment in the way it was intended in a consistent and accurate fashion is referred to as treatment integrity (Gresham, 1989; Salend, 1984; Watson, Sterling, & McDade, 1997). Moderate to high levels of treatment integrity are considered essential if the treatment plan is to be effective

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(Rhymer, Evans-Hampton, McCurdy, & Watson, in press; Sterling-Turner, 1999; Watson & McCurdy, 2000). Often teachers or parents may not have the requisite skills or knowledge base to implement the prescribed intervention adequately. Therefore, school psychologists are often needed to train others to implement behavior management protocols designed to address problematic student behaviors.

Behavioral researchers and applied practitioners assert that treatment integrity may be one of the most essential, yet neglected, variables in behavioral programming (Gresham, 1989; Watson et al., 1997). The assessment of treatment integrity is considered to be important because to address treatment effectiveness, one must first address treatment integrity to determine if changes in the target behavior are because of treatment effects (Baer, 1994). If treatment integrity is not assessed and treatment outcomes are positive, it is difficult to determine if effects are because of the effectiveness of the intervention or to other, extraneous factors. If desired treatment outcomes do not occur, it may be because of use of an inappropriate treatment for the target behavior or failure to implement the procedures appropriately (Gresham & Kendall, 1987).

The resurgence of interest in the assessment of the "independent variable" (i.e., treatment integrity; Peterson, Homer, & Wonderlich, 1982; Salend, 1984) seems to be fueled, in part, by independent examinations of the behavior analytic research (Gresham, Gansle, & Noell, 1993), school-based intervention research (Gresham, Gansle, Noell, Cohen, & Rosenblum, 1993), and parent-training research literature (Wiese, 1992). Findings from these reviews of intervention research literature indicate there has been a lack of emphasis on collecting treatment integrity data, leading researchers to call for the measurement of treatment fidelity in both purely experimental and applied research. Gresham et al. (1993) included additional findings in their literature review that underscore the importance of collecting treatment integrity data by providing evidence that treatment integrity may be related to treatment outcomes. Their review showed a significant, moderate correlation ($r = .51$ for group studies; $r = .58$ for single-subject design studies) between treatment integrity and treatment outcomes (Gresham, et al., 1993). Treatments for which integrity was addressed were likely to be associated with positive treatment outcomes if the associated treatment fidelity was also high.

Recently, researchers have focused on various means by which to increase treatment integrity. For example, Erhardt, Barnett, Lentz, Stollar, and Reifin (1996) used scripts to guide teacher's implementation of treatments designed during Behavioral Consultation (BC). Results showed high treatment integrity with the use of the scripts and concomitant behavior change for each client. Galloway and Sheridan (1994) found that the use of Conjoint BC procedures with the use of a home-school note increased parents' and teachers' treatment integrity to the home-school note over use of the home-school note alone. Martens, Hiralall, and Bradley (1997) showed that teacher-designated goal-setting and performance feedback was effective for increasing a teacher's use of contingent

praise for appropriate student behavior. Noell, Witt, Gilbertson, Ranier, and Freeland (1997) and Witt, Noell, LaFleur, and Mortenson (1997) used performance feedback to promote treatment integrity to interventions designed to target student academic performance.

Although the studies listed above represent innovative and novel means by which to increase treatment integrity, individual results (both within and across studies) do not provide clear evidence of the impact of treatment integrity on treatment outcomes. For example, Galloway and Sheridan (1994) found increases in children's mathematics performance across conditions, regardless of the fact that higher treatment integrity was found for the parents and teachers who participated in Conjoint BC. In Noell et al.'s (1997) study, only one student's academic gains appeared to be functionally related to the degree of teacher treatment integrity. Two participants' academic performance improved (over baseline levels) when teachers' treatment integrity was low and did not improve when the intervention was implemented with a higher degree of integrity. A likely cause for these conflicting findings is that indirect measures (e.g., verbal self-report and calculation of integrity from permanent product data) representing treatment integrity were used. Although indirect measures may, at times, be necessary in applied cases, use of such methods in experimental research examining integrity variables has been shown to provide overestimates of actual treatment integrity (Wickstrom, Jones, LaFleur, & Witt, 1998).

Gresham (1989) suggested that a number of variables may be related to treatment integrity, including (a) how difficult the intervention is to implement; (b) how much time the intervention requires of the treatment agent; (c) how many individuals are required to be involved in the treatment implementation; (d) how the treatment strains the treatment agent's resources; and (e) how acceptable the treatment is to the person responsible for implementing the treatment. One major variable not addressed by Gresham (1989), but certainly related to treatment integrity, is training in intervention procedures. Training can usually be divided into two main categories. The first main category may be described as indirect training procedures in which intervention agents are exposed to the proposed treatment via didactic instruction or are provided with written materials describing the intervention. The second main category of training, direct instruction, involves procedures such as modeling, role playing, rehearsal, and feedback (both positive and corrective). With direct training procedures, intervention agents are afforded greater opportunities to practice skills that increase both the probability of appropriate use of treatments and the probability of skill generalization (Salend, 1984).

Previous research has indicated that the type of training a consumer is exposed to can influence treatment integrity. For example, Watson and Kramer (1995) investigated three different methods of teaching problem identification skills to teachers-in-training and found that participants who received modeling or modeling plus rehearsal/feedback training (i.e., direct training) were able to identify and analyze problems more accurately than participants who only received didactic training (i.e., indirect training). Results from single-subject design studies focus-

ing on parent training (Richman, Harrison, & Sumers, 1995; Rickert, Sottolano, Parrish, Riley, Hunt, & Pleco, 1988; Stark, Powers, Jelalian, Rape, & Miller, 1994), mental health professional training (Davis & Russell, 1990; Isaacs, Embry, & Baer, 1982; Shore, Iwata, Vollmer, Lerman, & Zarcone, 1995), and consultant training (Kratochwill, Elliott, & Busse, 1995; Kratochwill, Sheridan, Rotto, & Salmon, 1991; McDougall, Reschly, & Corkery, 1988; Sheridan, 1992) consistently show that direct training procedures result in high levels of treatment integrity, especially when compared with indirect methods of training.

Although many studies have shown the importance of direct training procedures for increasing treatment integrity, few studies (Watson & Kramer, 1995) have compared multiple training methods simultaneously. In addition, many single-subject design studies comparing training methods have used multiple-baseline designs in which indirect training procedures are first introduced and are then followed by direct training procedures. Therefore, participants have had exposure and practice in the implementation of the behavior protocol before direct training procedures.

This research study attempts to expand on previous literature by examining training method and resulting treatment integrity by (a) training participants to implement a complex behavior protocol, and (b) recording the integrity with which participants implement the protocol. Direct measures of integrity were collected in an attempt to extend previous studies that have relied on indirect measures of treatment integrity. In addition, participants were only exposed to one type of training procedure to limit carry over effects as the result of previous exposure and training in treatment procedures. To provide as much experimental control as possible, the same intervention and procedures representing varying types of training were used. Based on previous research findings, it was expected that more direct training methods would lead to higher treatment integrity.

METHOD

Participants

Participants were 64 undergraduate students enrolled in a Southeastern American university and recruited from three undergraduate educational psychology classes. All classes were informed that the primary author was conducting a research study to examine different treatments for habit disorders. Participants were told they would be trained to implement a treatment protocol with a client (actually a confederate) who was being treated at the School Psychology Clinic for a habit disorder (i.e., facial tic). No other information regarding the case was given to the participants.

Procedures

After the primary experimenter explained the procedures, all participants read and signed an informed consent statement, a videotape permission and release

statement, and a one-page confidentiality statement that was included to enhance the credibility of the study. Participants then scheduled individual times for training and assessment.

Participants were randomly assigned to one of three experimental conditions: didactic training (DT), modeling training (MT), or rehearsal/feedback training (RFT). When participants arrived at the clinic, they were reminded of confidentiality and their right to withdraw from the study at any time. Of the original pool of participants (N = 66), only two participants chose to withdraw during the study. Participants were given a packet of materials containing a case description, treatment protocol, and a brief questionnaire. Participants were instructed to read the packet in the order presented and then to complete the questionnaire. Participants then received a written summary of the treatment protocol and went to a training session conducted by the primary experimenter. To control for time spent in training as a confounding variable, all training sessions took 5 minutes to complete. After the 5-minute training procedure, participants were taken to a standard treatment room where they were introduced to the confederate (client). The room was approximately $6' \times 6'$ and contained a small table, two chairs, and two wall-mounted video cameras. The confederate sat on one side of the table, facing the participant. All materials needed to implement the treatment protocol (i.e., stopwatch, cup filled with tokens, spray bottle, pencil, and data recording sheets) were already placed on the participant's side of the table. During the treatment sessions, the confederate exhibited the same, moderate (i.e., equivalent to rates noted in the case description) levels of tic behavior regardless of the experimental condition or level of procedural integrity (i.e., the same number of tic behaviors were demonstrated across participants and the rate of ticing did not improve or increase substantially within the course of a session). After all data were collected and analyzed, participants were debriefed regarding the deception involved and the results of the study were presented and explained.

Case Description and Treatment Protocol. A written description of a college-age student who was seeking treatment at the campus School Psychology Clinic for a facial tic was developed by the first and second authors. The case description included demographic information (e.g., age, year in school), a description and history of the presenting problem, and how the presenting problem affected the client emotionally and socially. A copy of the case description may be found in Appendix A.

The treatment protocol was a multicomponent intervention plan involving reinforcing zero rates of the target behavior, alerting the client to antecedent tic behaviors, punishing tic behavior, and data collection. Each component of the protocol was presented separately with a rationale for its use in the treatment. A multicomponent treatment was chosen for three primary reasons: (a) to closely model treatment plans for tics used in actual practice; (b) to make conditions more natural and similar to in vivo situations; and (c) to provide multiple measures on which to collect treatment integrity data thereby increasing the range of possible scores (variability) on the treatment integrity measure. All treatment

procedures were variations of interventions offered in the applied behavior analysis literature and all procedures in the present study were reviewed and approved by the University's Institutional Review Board. A copy of the treatment protocol may be found in Appendix B.

Dependent Variables

Treatment Integrity. Participants completed a 23-minute treatment session with the confederate (four 5-minute sessions with one minute of rest between each of the first three sessions). All sessions were videotaped and coded to measure treatment integrity (i.e., did the participant follow the treatment protocol as directed). Each of the four sessions was measured for the following criteria: (a) staying within the 5-minute time limit; (b) responding verbally to each instance of the pre-tic behavior by saying "no;" (c) reminding the confederate to pop himself with the rubber band for each instance of a pre-tic behavior; (d) spraying the confederate in the face after each instance of a tic; (e) providing verbal praise for each tic-free interval; (f) providing a token for each tic-free interval; and (g) proper data recording. Total integrity scores were converted into percentages to have standard scores for all participants for group comparisons and to be consistent with how integrity scores are typically reported in applied research.

Independent Variable

Participants in this study received 5 minutes of training, using one of the three procedures described below, to implement the treatment protocol. The information given to the participants regarding the treatment protocol (i.e., what to do contingent upon each target behavior and data collection procedures) was held constant across training conditions. The primary difference between the conditions was the method used to relay the information.

DT. During the DT session, the treatment procedures were verbally explained to the participant. The primary experimenter used a checklist to ensure that each component of the protocol was addressed and that three examples of target behaviors (i.e., pre-tic and tic) were demonstrated. First, the primary experimenter demonstrated an example of both a pre-tic and a tic so that the participant could identify the target behaviors. Then, each component of the treatment protocol (i.e., pre-tic treatment, tic treatment, reinforcement, and data recording) was described in detail. While explaining the treatment components, examples of the target behaviors were once again demonstrated. After explaining each separate component, a verbal summary and target behavior examples were provided and participants were given an opportunity to ask questions.

MT. Participants receiving MT watched a videotape of a 5-minute treatment session conducted by the primary experimenter. While viewing the tape, the primary experimenter provided verbal explanations to the participant for the first two instances of each component of the protocol (e.g., "That was a tic, so now I will spray him in the face, then I will mark down a 'T' on the data sheet in the

correct interval"). Participants were not given an opportunity to ask questions regarding the treatment protocol.

RFT. Participants in the RFT condition received 5 minutes of training with the primary experimenter and the confederate. Verbal prompts were delivered for the first two instances of each component of the protocol (e.g., "That was a pretic, so now you should tell him 'no' in a loud, strong voice, remind him to pop himself, and mark down a 'P' in interval {correct number}"). In RFT, participant's mistakes were corrected when implementing the treatment protocol and contingent praise was delivered for correctly implementing the treatment protocol.

Interscorer Reliability and Independent Variable Treatment Integrity

A total of 20% of the videotaped sessions were coded by two independent raters for participants' total level of treatment integrity. Interscorer agreement was calculated by dividing the number of agreements for steps implemented correctly by the number of agreements for steps implemented correctly plus the number of disagreements and multiplying by 100%.[1] Interscorer agreement was 90%.

A checklist was used to assess treatment integrity for the training procedures along the following parameters: (a) conducting training within the 5-minute time limit; (b) presenting and explaining each component of the treatment protocol appropriately for the specified training condition; and (c) explaining the data collection sheets. Data from 15 randomly selected checklists (20% of the training sessions) showed the primary experimenter performed procedures appropriately for 100% of the sessions.

RESULTS AND DISCUSSION

Table 1 shows mean and standard deviations for percent treatment integrity across training conditions. A one-way analysis of variance (ANOVA) was used to compare the mean integrity scores in each training condition. The ANOVA yielded a significant effect, F (2, 61) = 20.01, MSE = 213.99, $p < .0001$. Fisher LSD post hoc analyses indicated significant differences among all groups. Participants who received the most direct training, RFT, had a higher mean percentage of treatment integrity than participants who received less direct training, who in turn scored higher than participants who received indirect training.

Based on the results of the present study, a number of tentative conclusions can be made. The first and perhaps most important conclusion that can be taken from these findings relates to training in treatment implementation. The results of the current investigation support findings of previous research studies investi-

1. Although data collectors coded data simultaneously, coefficient κ may have been a more appropriate procedure for interobserver agreement data collection to control for chance agreement. However, data were calculated originally via the stated method and because of loss of raw data, we were unable to calculate κ coefficients.

TABLE 1. Treatment Integrity Means and Standard Deviations across Experimental Conditions

		Treatment Integrity[a]	
Condition	*n*	*M*	*SD*
DT	21	50.95	19.43
MT	20	70.85	11.98
RFT	23	84.48	11.24
Total	64	69.22	20.11

Note. DT = didactic training, MT = modeling training, RFT = rehearsal/feedback training.

[a]Scores are percentage of treatment components correctly implemented.

gating training issues. Direct training procedures led to higher treatment integrity when compared with indirect, DT procedures. Participants receiving opportunities for practice and feedback had a higher degree of treatment integrity than other, less direct models of training. In addition, results showed the less direct the training, the lower the integrity. These results underscore the importance of providing sufficient, direct training with feedback when third parties are responsible for implementing treatment procedures.

The findings also may have implications for school-based consultation in that the results seem to support a more direct model of consultation, such as that proposed by Watson and Robinson (1996). Presently, training in treatment implementation in consultation typically occurs in a very indirect manner. Many consultants verbally outline (and perhaps write) a treatment plan for a teacher or parent and then expect the consultee to have the knowledge and understanding of the plan to perform it effectively. Most consultants do not know upon entering the consultation relationship if consultees have the requisite skills and knowledge regarding behavioral treatments to implement the protocol effectively. Watson and Robinson (1996) suggest that providing more direct training allows the consultant to check for and ensure that consultees understand the procedures, thereby heightening the probability that procedures will be implemented with a high degree of integrity.

Previous research has shown that treatment integrity is positively related to treatment effectiveness (Gresham et al., 1993; Rhymer et al., in press; Sterling-Turner, 1999; Watson & McCurdy, 2000). Interventions that were implemented with a high degree of treatment integrity were associated with desired outcomes (i.e., an effective treatment). It is possible that failure to achieve desired goals during consultation may be because of failure on the part of the consultant to adequately train the consultee to implement procedures appropriately. If a consultee is poorly trained and therefore has a poor understanding of the treatment procedures, it is likely that the integrity with which the treatment is implemented will be low. Inadequate implementation of procedures may lead to a host of negative outcomes for the client and consultee alike. For example, the problem behavior may

not change at all, the behavior may change in an undesired direction, or the consultee may be dissatisfied with the treatment and consultation in general.

The present results should be considered as tentative conclusions based on a number of limitations of the methodology used in this study. To control for the influence of extraneous variables and to obtain direct measures of treatment integrity, a controlled setting was used, that limited the generalizability of the results. The present study was conducted in a contrived clinical setting with college-aged participants who had no input into the proposed treatment plans; therefore, the results may be, at best, only generalizable to clinic-based settings rather than school-based settings. Because the primary experimenter conducted all training sessions, there also exists the possibility that experimenter bias may have influenced some of the data obtained in this study. To minimize these effects, independent observers rated the adherence to training procedures and coded treatment integrity data. Perhaps the most serious threat to internal validity was that participants were only exposed to brief training procedures (i.e., 5 minutes), which may have been insufficient to promote high levels of treatment integrity. However, all three training groups received the same amount of training time, yet the RFT group had high levels of treatment integrity ($M = 84.48\%$) suggesting that brief, appropriate direct training procedures may be sufficient for promoting treatment integrity.

In summary, the results of the present study suggest that continued investigations should be conducted addressing training issues in promoting treatment integrity, especially in consultative interactions. Not surprisingly, these findings show direct training procedures resulted in higher treatment integrity. This study is not meant to be the ultimate study regarding treatment integrity. Instead, it is hoped that these findings will serve as a heuristic for more applied research in consultation, interventions, and the influence of training method on treatment integrity and treatment outcomes.

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APPENDIX A

Case Description

Mark is a 23-year-old male college student. He has come to the campus clinic to receive treatment for a complicated motor tic that has existed for approximately 2 years. A motor tic consists of an involuntary, jerky movement of some part of the body's musculature. Mark's particular tic involves three major components. Just before Mark exhibits his tic, he will arch his eyebrows (pre-tic behavior). After lifting his eyebrows, Mark squeezes his eyes tightly shut, then briefly jerks his head violently from one side to the other. This tic is very noticeable to others and causes Mark considerable personal and social distress.

Mark reports that he is unaware of the tic for the most part, until after the tic is over. Mark's family members and roommate often point out his behavior to him. He occasionally notes the behavior himself when he is "stressed out" or "bored." Based on observations during interviews, we have determined that Mark will tic, on average, 20 times in approximately 30 minutes.

Mark often misses classes to avoid being in social situations where other people might notice his behavior. He feels that everyone in class is watching him and noticing his tic, even though he sits in the back of the room. Mark has not dated since he has developed his tic. He feels that women will consider him "weird" or "nervous," and therefore he does not ask women to go on dates with him.

APPENDIX B

Treatment Protocol

Based on the information provided by Mark and on observations of his behavior, the following treatment package has been devised to lower Mark's rate of motor tics. Treatment sessions will be conducted in four 5-minute intervals with 1 minute of rest between each interval (total of 23 minutes for each treatment session). You will be provided with a stopwatch to time the sessions, a data sheet to record the occurrences of tics, and a point sheet to record number of tokens given during treatment sessions.

1. Pre-Tic Behavior Treatment. Because we are able to predict what is likely to happen based on Mark's eyebrow raising (pre-tic behavior), it is important to target this behavior in treatment, in hopes that the awareness of pre-tic behavior will reduce the overall rate of tic behavior. When Mark raises his eyebrows, you are to reprimand him in a loud, firm voice by saying "NO!" Mark will then self-administer a "pop" to his wrist with a rubber band worn on his arm. The pop is not intended to hurt Mark, but rather to make him more aware of his pre-tic behavior.

2. Treating Actual Tics.[2] Simply increasing Mark's awareness of his pre-tic behavior may not be sufficient at the outset of treatment to reduce his tic rate. Therefore, the second part of the treatment package will involve punishing actual tic behavior. Punishment will be used to reduce the rate of tics because of the high rate of the behavior. On occasions that Mark tics, you will spray him in the face with a vinegar water solution, which will irritate his eyes, skin, and nasal passages.

3. Reinforcement Component. Because we are not only interested in punishing tic behavior but pointing out instances when Mark does not tic, a reinforcement procedure will be built into the treatment package. This will create a strong contrast between ticing and non-ticing behavior for Mark. To perform this part of treatment, you will observe Mark in 15-second intervals, using the provided stopwatch to keep time accurately. If no occurrences of tics are noted in that interval, you will deliver verbal praise (i.e., "That's very good Mark, you haven't twitched your eye in 15 seconds"). After delivering praise, you will give Mark a token which he may later trade for desired items that he has selected (e.g., movie rentals, fast food coupons) and mark Mark's point sheet so we may keep track of the number of tokens delivered.

4. Data Recording. In addition to treating Mark's tics, we need to keep data regarding the treatment sessions. This data will help us monitor Mark's progress and to show Mark his improvements to further encourage him. Data recording will consist of two major components: first, you will mark each instance of pre-tic behavior and actual tics on the data recording sheet for the appropriate interval. Each 5-minute session will be divided into 20 15-second intervals. For the appropriate interval, you will mark each instance of pre-tic behavior (eyebrow raises) and actual tics. Pre-tics will be denoted as "P" and tics will be denoted as "T" on the data sheet. If no tic occurs in a given interval, leave the interval on the data recording sheet blank. Again, you will also mark the point sheet to show the number of reinforcers given.

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2. The authors would like to stress that at no time was the confederate sprayed in the face with any substance other than water. The outside of the spray bottle was rubbed with vinegar and a cup of vinegar was hidden in the room to give the impression that the bottle contained a vinegar water solution. This deception was included only to enhance the credibility of the study. Participants were debriefed at the conclusion of the study.