

*THE EFFECTS OF RESPONSE EFFORT ON SAFE PERFORMANCE BY THERAPISTS AT AN AUTISM TREATMENT FACILITY*

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The effects of response effort on safe behaviors (i.e., glove wearing, hand sanitizing, and electrical outlet replacement) exhibited by therapists at an autism treatment center were examined. Participants were exposed to 2 or 3 levels of effort (i.e., high, medium, low) for each dependent variable. Results showed increased safe performance during the low-effort conditions relative to other conditions across all dependent variables for all participants.

*Key words:* autism, human service settings, response effort requirement, safe performance

According to the National Safety Council (2007), 4.1 million nonfatal occupational injuries occurred in the United States in 2006. Safety is a particularly important concern in health care settings. Among the most important safety-related behaviors in these settings are wearing protective gloves, hand washing, and covering electrical outlets. The Centers for Disease Control and Prevention (CDC, 2002) recommend universal health precautions, which include wearing gloves when the potential for contact with blood, saliva, mucous membrane, or skin cuts exists. However, glove wearing is infrequent; due to poor barrier protection, 2 million people are infected by diseases annually (Garner, 1996).

Hand washing is another important preventive measure in health care settings. The CDC (2002) recommends washing hands or using an alcohol-based sanitizer when hands are visibly soiled, before and after contact with each patient, and when gloves are removed. Unfortunately, this practice is also often ignored. According to Pittet (2001), over a 20-year period, staff workers in various hospital settings in Geneva, Switzerland, exhibited a less than

50% compliance rate with hand hygiene protocols.

An additional safety concern, particularly in health care and education facilities that serve young children, is proper safety precautions with respect to electrical outlets. Every year hospital emergency rooms treat roughly 3,900 injuries related to electrical outlets (Consumer Product Safety Commission, 2008). Simple placement of electrical outlet covers can prevent many of these injuries and reduce the costs associated with them.

Although procedures to increase safety in health care settings have been evaluated in a few studies (Alavosius & Sulzer-Azaroff, 1986; Babcock, Sulzer-Azaroff, Sanderson, & Scibak, 1992; Devries, Burnette, & Redmon, 1991; Nielsen, Sigurdsson, & Austin, 2009), no study has examined the manipulation of response effort to increase safe performance in these settings. Response effort is the amount of effort a person must put forth to successfully complete a specific behavior and has been hypothesized to have a direct impact on the frequency with which the person will engage in that behavior (Friman & Poling, 1995). The purpose of this study is to examine the effect of manipulating response effort on glove wearing, hand sanitizing, and electrical outlet replacement by therapists at an autism treatment center.

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## METHOD

### *Participants and Setting*

The study took place at a university-affiliated autism treatment facility that provides behavioral services for children up to the age of 18 years who have been diagnosed with autism. The treatment facility consisted of two therapy rooms, both with one-way observation windows. Participants in this study were three female therapists (Meg, Allie, and Sally). All participants were between 22 and 27 years of age, had a bachelor's degree, and had been employed for at least 3 months.

### *Dependent Variable and Data Collection*

The dependent variables included glove wearing, hand sanitizing, and electrical outlet replacement. *Glove wearing* was defined as putting gloves on at the appropriate times while in the facility. These times included (a) prior to toilet training and client wet checks, (b) during a session in which edible items were used, (c) while using spill kits, (d) when handling soiled clothing, and (e) while using cleaning products. Staff members were to put on a new pair of gloves after transitioning from one task to another (e.g., after toileting, a new pair of gloves should be put on if handling food) and after returning from the outside playground. *Hand sanitizing* was defined as using the available bottle of sanitizer to sanitize hands at the appropriate times, such as before and after client sessions and after client toilet training, using spill kits, client wet checks, using cleaning products, sneezing or coughing into hands, removing gloves, and outside breaks. *Electrical outlet replacement* was defined as placing plastic protectors on empty outlets.

Data were collected with paper and pencil during 1-hr sessions. Both morning and afternoon sessions were conducted. Trained data collectors observed participants through one-way observation windows or were present with the client in the treatment room during client sessions. Observers recorded the number

of opportunities and occurrences of glove wearing and hand sanitizing per hour-long session. A percentage-of-safe-performance score was calculated for each session by dividing the total number of occurrences by the total number of opportunities and converting the ratio to a percentage. Immediately before the therapist's arrival for each session, the experimenter uncovered all outlets. There were 16 outlets in one room and 14 outlets in the other. At the end of each session, observers recorded the number of outlet covers the therapist replaced. Outlets could not be covered by another therapist; only the target therapist entered the room during sessions. A percentage-of-safe-performance score for outlet replacement was calculated for each session by dividing the number of outlets covered by the total number of outlets and converting the ratio to a percentage.

### *Interobserver Agreement and Integrity of the Independent Variable*

Reliability of observations was assessed for 41% of sessions for glove wearing, 30% for hand sanitizing, and 28% for electrical outlet replacement. Observers were required to demonstrate 100% accuracy in data collection for two consecutive practice sessions before the study began. In addition, observers had a written explanation of appropriate opportunities and times for glove wearing and hand sanitizing to which they could refer when collecting data. For glove wearing and hand sanitizing, each session was divided into 5-min intervals. An agreement was defined as both observers recording the same number of opportunities and occurrences during an interval. For each session, interobserver agreement was evaluated by calculating the number of agreements divided by the number of agreements plus disagreements (12) and converting the ratio to a percentage. Overall agreement for each dependent variable was determined by calculating the mean agreement score for all sessions for that dependent variable. For

electrical outlet replacement, an agreement was defined as both observers recording an outlet as either covered or uncovered. For each session, interobserver agreement was evaluated by calculating the number of agreements divided by the number of agreements plus disagreements (always 14 or 16, depending on the room in which the session was conducted) and converting the ratio to a percentage. Overall agreement for electrical outlet replacement was determined by calculating the mean agreement score for all sessions for that dependent variable. Mean agreement was 85% (range, 50% to 100%) for glove wearing, 81% (range, 50% to 100%) for hand sanitizing, and 100% for electrical outlet replacement. Integrity of the independent variable (i.e., whether or not proper effort manipulation was in place) was noted by observers on the data sheet during 30% of the sessions. Integrity was 100% throughout the study.

#### *Experimental Design and Procedure*

A multielement design was used to evaluate the effects of response effort on safe performance. Prior to the study, the experimenter delivered memos to each employee stating precisely how and when the safe behaviors should occur. Specifically, the memo told participants how and when to wear gloves and sanitize hands, and to replace outlet covers at any time they checked a room and found an outlet exposed. Employees then had an opportunity to ask questions and receive feedback about how and when to perform the three safety-related behaviors. Finally, each employee was required to sign a form stating that she had read and understood the memos.

*Manipulation of response effort.* Manipulations of response effort were conducted across all three target behaviors. The proximity of gloves and electrical outlet replacements were manipulated, as was the pressure required to use the hand-sanitizing dispenser. There were three different conditions for glove wearing: low (gloves were placed within 0.61 m of the

participant), medium (within 3 m of the participant), and high (approximately 6.1 m from the participant) effort. For hand sanitizing, two conditions were used: low (sanitizer dispenser required normal pressure to obtain liquid) and high (sanitizer dispenser required higher than normal pressure to obtain liquid). In the high-pressure condition, the participant had to depress the dispenser very strongly; however, every time she depressed the sanitizer, she did receive some sanitizing lotion. There were two conditions for electrical outlet replacement: low (plastic protectors placed within 0.30 m of the participant) and high (plastic covers 6.1 m from the participant) effort. The conditions were manipulated quasirandomly (i.e., they were random except that no more than two of the same consecutive condition were permitted). Location could be manipulated because each participant worked with a client while seated in a chair in the therapy room (except when toileting); gloves and outlet covers were moved in relation to chair placement. She remained in or very close to the chair at all times.

## RESULTS AND DISCUSSION

Figure 1 depicts results for each of the three dependent variables. For glove wearing, safe performance varied according to the response-effort condition in place (low,  $M = 59\%$ ,  $SD = 27$ , range, 20% to 90%; medium,  $M = 47\%$ ,  $SD = 22$ , range, 10% to 66%; high,  $M = 3\%$ ,  $SD = 6$ , range, 0% to 33%). For hand sanitizing, higher levels of safe performance were observed in the low-effort condition ( $M = 21\%$ ,  $SD = 22$ , range, 0% to 60%) than in the high-effort condition ( $M = 4\%$ ,  $SD = 14$ , range, 0% to 50%). Participants covered electrical outlets more often in the low-effort condition ( $M = 26\%$ ,  $SD = 42$ , range, 0% to 100%) than in the high-effort condition ( $M = 0\%$ ).

Figure 2 depicts individual safe performance across the three dependent variables for each

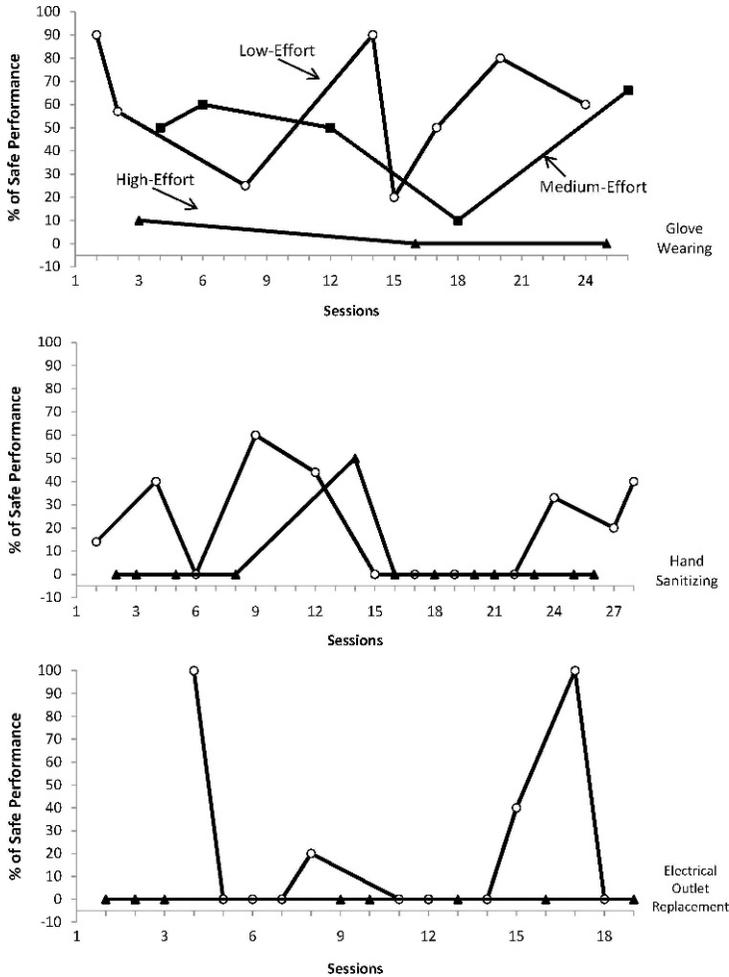


Figure 1. Percentage of opportunities in which safe behavior was exhibited for glove wearing (top) and hand sanitizing (middle), and the percentage of electrical outlets covered (bottom).

participant. Meg's and Sally's safe performance varied according to the response-effort condition in place; they performed more safely when less effort was required. Allie's safe performance was similar, although she performed slightly more safely in the medium-effort condition of the glove-wearing manipulation than she did in the high-effort condition.

These results show that a response-effort requirement can affect safe performance by therapists at an autism treatment center; when response effort is increased, safe performance decreases. This study indicates that response effort is an important variable that should be considered

when reviewing the use of safety interventions and designing safety procedures in human services settings. It is recommended that all materials and equipment needed to engage in safe performance for all employees should be available in the immediate work environment, should be within easy reach, and require little pressure to obtain (as in dispensing hand sanitizer).

This study is not without limitations. First, due to scheduling conflicts, only three therapists participated. Second, data were only collected in some settings at the facility. Hand sanitizing and use of gloves may have been common in the restroom, but no data were collected in this

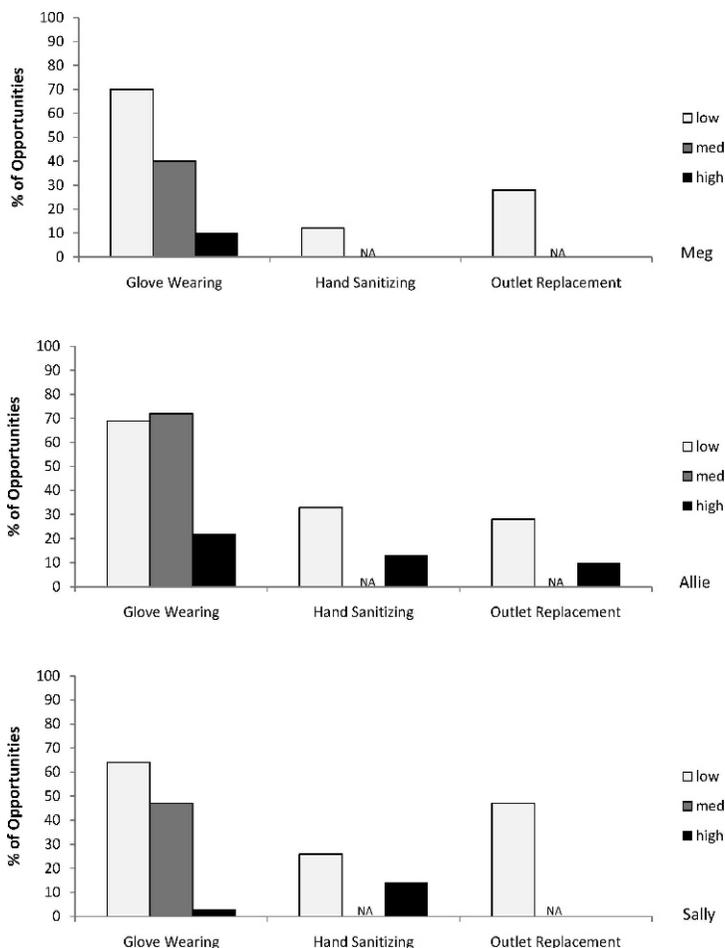


Figure 2. Percentage of opportunities with safe behavior for glove wearing, hand sanitizing, and outlet replacement across effort conditions for Meg, Allie, and Sally.

location. Third, carryover effects are possible for hand sanitizing. That is, it is possible that the extra effort required to use the sanitizer during initial high-effort sessions decreased the likelihood of using it in subsequent sessions.

REFERENCES

Alavosius, M., & Sulzer-Azaroff, B. (1986). The effects of performance feedback on the safety of client lifting and transfer. *Journal of Applied Behavior Analysis, 19*, 261–267.

Babcock, R., Sulzer-Azaroff, B., Sanderson, M., & Scibak, J. (1992). Increasing nurses' use of feedback to promote infection-control practices in a head-injury treatment center. *Journal of Applied Behavior Analysis, 25*, 621–627.

Centers for Disease Control and Prevention. (2002, October 25). *Universal precautions for prevention of transmission of HIV and other bloodborne infections*. Retrieved from [http://www.cdc.gov/ncidod/dhqp/bp\\_universal\\_precautions.html](http://www.cdc.gov/ncidod/dhqp/bp_universal_precautions.html)

Consumer Product Safety Commission. (2008). *Electrical receptacle outlets*. Retrieved from <http://www.cpsc.gov/CPSPUB/PUBS/524.html>

Devries, J., Burnette, M., & Redmon, W. (1991). AIDS prevention: Improving nurses' compliance with glove wearing through performance feedback. *Journal of Applied Behavior Analysis, 24*, 705–711.

Friman, P., & Poling, A. (1995). Making life easier with effort: Basic findings and applied research on response effort. *Journal of Applied Behavior Analysis, 28*, 583–590.

Garner, J. (1996, January). *Guidelines for isolation precautions in hospitals*, Hospital Infection Control Advisory Committee. Retrieved from <http://wonder.cdc.gov/wonder/prevguid/p0000419/p0000419.asp>

- National Safety Council. (2007). *Report on injuries in America, 2007*. Retrieved from [http://www2.nsc.org/library/report\\_injury\\_usa.htm](http://www2.nsc.org/library/report_injury_usa.htm)
- Nielsen, D., Sigurdsson, S., & Austin, J. (2009). Preventing back injuries in hospital settings: The effects of video modeling on safe patient lifting by nurses. *Journal of Applied Behavior Analysis, 42*, 551–561.
- Pittet, D. (2001, March). *CDC—Emerging infectious diseases*. Retrieved from <http://www.cdc.gov/ncidod/eid/vol7no2/pittet.htm>

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