**Video Modelling Intervention in Toilet Training Children on the Autism Spectrum**

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**Date:**              **November 14, 2020**

**Review date:** **November 14, 2022**

**CLINICAL SCENARIO:**

Acquisition of toilet training for children with autism spectrum disorder (ASD) may be negatively impacted due to impairments in language acquisition, cognitive skills and sensory processing (Piccin et al., 2018). It has been noted that dependence with toileting has a negative impact in many areas of life and experiences of people with disabilities (Kroeger et al., 2009). Methods to toilet train individuals on the spectrum have relied heavily on behavioural based learning interventions (Keen et al., 2007). Video modelling is a low-cost effective intervention technique used to teach skill acquisition to children with ASD across environmental settings (Delano, 2007).  In my practice as a school based occupational therapist the video modelling (VM) intervention technique is used with children on the autism spectrum to toilet train and teach other activities of daily living as an adjunct to various learning theories. These experiences led me to the PICO question found below.

**FOCUSED CLINICAL QUESTION:** In children (ages 4-8 years old) on the autism spectrum how does video modelling in a toilet training program compared to a toilet training program without video modelling affect the ability to be fully toilet trained?

**SUMMARY of Search, 'Best' Evidence' Appraised, and Key Findings**
Databases searched included CINAHL, Pubmed clinical query and Medline. 4 articles were selected as the best evidence on the topic of video modelling and toilet training by meeting the inclusion criteria and a best match to my PICO question. All 4 studies used a single subject research design with a level of evidence ranging from I to V.  The population included children ages 4-8 years old diagnosed with autism spectrum disorder (ASD). Intervention focused on video modelling (VM) however, the amount of behavioural strategies utilized was approached differently in each study. Only one study by (Keen et al., 2007) used a control condition to determine if video modelling with behavioural strategies had different outcomes to behavioural toilet training alone. The study by (McLay et al., 2015) intentionally combined VM with behavioural strategies and then was unable to determine which strategy had the most impact on toilet training outcomes. Each study concluded that video modelling has a positive impact on the outcomes of  toilet training such as, in toilet voiding (Keen et al., 2007), in toilet elimination (McLay et al., 2015) clothing management (Drysdale et al., 2015) and improvements in key toileting skills (Lee et al., 2014) and that skills are maintained over time and are generalized to other environments.

**CLINICAL BOTTOM LINE:** The best evidence indicates that video modelling is a beneficial intervention when used in combination with behavioural strategies for toilet training children on the autism spectrum.

**Limitation of this CAT:**  This critically appraised paper (or topic) was prepared for a graduate course assignment and has been reviewed by an instructor.

**SEARCH STRATEGY:**

**Terms used to guide Search Strategy:**

● **P**atient/Client Group: Children on the autism spectrum Ages 4-8

● **I**ntervention (or Assessment): Video modelling

● **C**omparison: Toilet training without video modelling

● **O**utcome(s): Toilet trained

| Databases and Sites Searched | Search Terms | Limits Used |
|---|---|---|
| CINAHL (Ebsco)<br><br>Embase (Ovid)<br><br>Pubmed clinical query | ● **Population**:<br>Children on the autism spectrum Ages 4-8, MeSH "MH" or /<br>Autism Spectrum Disorder Child development, MeSH "MH" or /<br>Autism Spectrum Disorder, Child development disorders<br>Keywords: Asperger's, Autism, Autism disorder, ASD, Autistic, Developmental disabilities<br><br>● **Intervention:** Video modelling with toilet training, MeSH<br>Video Recording, Videotape recording methods*<br>Keywords: video, video modelling, video modelling Self-modelling imitation,<br>Wild card for variant spelling Video model#ing,<br>"Video modelling" "Video self-modelling"<br><br>● **Outcomes:** Toilet trained, MeSH Toilet Training, Activities of Daily Living/<br> Keywords: Toileting, toilet, daily routines, activities of daily living, daily living skills, self-care skills, toilet-training, Daily living activities, ADL "Fully trained" | ● research current<br><br>to 15 years<br><br>● All child<br><br>● Boolean operators<br><br>P & I , P & I &O |

## INCLUSION and EXCLUSION CRITERIA

Inclusion Criteria:
●     Primary diagnosis of Autism spectrum disorder

●     Children age 4-8 years old

●      Intervention of video modelling including: custom, commercial, self-modelling,

animated and point of view

●     All areas of self-care domains

Exclusion Criteria:

●     In vivo modelling

●     Adult population

●     Primary diagnosis of other developmental disorders

●     Outside of the self-care domain

## RESULTS OF SEARCH

4 studies were obtained that matched the inclusion criteria

**Table 1:** Summary of Articles Retrieved

| Study Design/ Methodology of Articles Retrieved | Level* | Number Located | Author (Year) |
|---|---|---|---|
| Best Evidence Studies | | | |
| Single subject research design | | 4 | |
| | IV | | (Drysdale et al., 2015) |
| | I | | (Keen et al., 2007) |
| | V | | (Lee et al., 2014) |
| | IV | | (McLay et.al, 2015) |

*Single subject research design: recommendations for levels of evidence and quality rating (Logan et al., 2008).

**BEST EVIDENCE**
The following study by (Keen et al., 2007) was identified as the 'best' evidence and selected

for critical appraisal. Reasons for selecting this study included:

●      Best match to my PICO question included all 4 of the components.

●      The comparison intervention techniques for toilet training were behavioural based

which is also in line with my clinical practice.

●      This is an appropriate study design for a small and unique population such as autism.

●      Level of evidence is at level I which enables the study to provide causal inferences

(Logan et al., 2008).

●      Meets all inclusion criteria.


**SUMMARY OF BEST EVIDENCE:**

**Table 2:  Description & Appraisal of:** Keen, D., Brannigan, K. L., & Cuskelly, M. (2007).

Toilet training for children with autism: The effects of video modelling. *Journal of*

*Developmental and Physical Disabilities*, 19 (4), 291-303.

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**Aim/Objective of the Study:** Determine if video modelling combined with operant

conditioning is a more effective toilet training intervention compared to the typical

standalone operant conditioning toilet training for children on the autism spectrum.

**Study Design**: This study is a single subject research design with matched controlled pairs

and multiple baselines using a baseline, treatment, withdrawal (ABA) design. Children were

matched together based on characteristics and assessed skills set then randomly assigned to

either a treatment or control condition. Outcome measures were taken at baseline,

intervention and follow up for daily in- toilet urinations.

**Setting**: Participants home and educational settings.

**Participants**: A purposive sample was recruited from multiple sources, N=5, male,

diagnosed with autism spectrum disorder, non-verbal, ages 4.5-6.9 years. mean age: 5.2

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years. The level of autism and functional capabilities of the sample group were established

using the following measures: Scales of Independent Behaviour, Gilliam Autism Rating Scale

and the Differential Abilities Scale.

**Intervention/Phenomenon Investigated:** Video modelling (VM) combined with operant

conditioning interventions vs. just operant conditioning intervention for toilet training.  All

participants received the VM treatment at a set point during the study. Parents and teachers

collected data and provided intervention for toilet training as trained by the researchers which

was supported with written documentation and phone call follow up. 2 weeks of baseline data

was collected for both groups to determine a pattern of voiding. During intervention both

groups were allowed to drink as much fluid as desired and received reinforcements for

achieving 7 discrete steps within the toileting routine and promised rewards for voiding in the

toilet. Children were required to sit on the toilet for 3 minutes approximately 6 -7 times a day

according to their baseline pattern of voiding. The adults used scripted language if the child

sat but did not void, had an accident or requested the bathroom. The adults provided minimal

level prompts to complete the toileting steps. Treatment group watched a 6-minute video

model of toileting prior to using the toilet. Children in the control condition did not watch a

video model of toileting.

**Outcome Measures:**

Daily frequency of in toilet urination recorded by parents and teachers during baseline and

treatment.

**Main Findings:**

Results were presented in graphic form capturing frequency of in toilet voids during the

phases of the study. Trend lines were not used but an additional bar graph was included to

communicate prompted versus unprompted toilet urination during treatment/control period.

Table 3: Summary of Main Findings

| Child | Baseline - frequency of in-toilet urinations | Treatment/ Control Phase frequency of in-toilet urinations | Treatment Phase (video) frequency of in toilet urinations | Withdrawal Phase (6 weeks post training) Urinated in toilet during withdrawal phase |
|---|---|---|---|---|
| Allen | 0 | n/a | 16 | no |
| John | 0 | 0 | 5 | yes |
| David | 0 | n/a | 11 | yes |
| Tim | 0 | 2 | 0 | no |
| Edward | 0 | n/a | 14 | no |

**Main themes:**

Children in the treatment group had more in toilet voids.

Children in the treatment group had a higher rate of maintenance of skills**.**

Visual tools in conjunction with operant conditioning can positively impact toilet training.

Privacy may be a key factor in toilet training children on the spectrum.

None of the participants achieved full toilet training by the end of the study.

**Original Authors' Conclusions** The authors found that VM combined with operant

conditioning techniques vs using only operant conditioning interventions resulted in a higher

rate of in- toilet voiding and maintenance of skills in children with ASD. However, the

researchers found that there were many contributing factors to the success or failures during

the toilet training process. "Responses of individual children to the toilet training procedures

used in this study emphasize complexities of toilet training for children with autism." (p.300).

**Critical Appraisal:**
Clinical appraisal tool SCRIBE checklist (2016) retrieved November 1, 2020, from the
Equator network reporting guideline website: https://www.equator-network.org/

**VALIDITY**

Using the quality test outlined in (Logan et al., 2008) this paper received a moderate rating

with a score of 9/14. Points were lost for lack of inter- rater and intra- rater reliability

assessment; no blinding of the outcome assessor and statistical analysis was not discussed.

Abstract contains all relevant information about the study. Background information on the topic was discussed, current scientific knowledge and gaps in the research were identified. Purpose of the study was outlined, and a hypothesis was stated.

**Methods**:

Design: A Single study research design using multiple baselines across 5 subjects and between groups was applied. Four phases: baseline, treatment /control, treatment and follow up. Participants were paired according to outlined characteristics and then randomly assigned to control or treatment groups to ensure similarity. Greater than 3 measurements were taken in each phase and onset of phases were staggered. A stable baseline was achieved demonstrating similarity of the groups and that data was not trending towards the target behaviour. This design promotes confidence in the internal validity and cause-effect relationship between the independent and dependent variable because of the multiple replications within subjects and between subjects, supported by the increase in target behaviours. Blinding was not done in either environment. Procedural changes (outlined in the article) were made for 3 subjects during the treatment phase to adjust for privacy however, experimental control over the independent variable was maintained.

Participants: The participants were a purposive sample recruited from multiple sources. Inclusion and/or exclusion criteria was not explicitly stated. Participant characteristics and demographics were outlined well including a chart for reference. Three standardized assessments were used to determine baseline skill sets. The information on participants is adequate to support generalization and applicability to clinical populations.

Context: The study took place in the child's home and educational setting. This was not elaborated on in any detail therefore it would be difficult to evaluate the settings overall environment as similar or different to our own. Replication of these settings could be

achieved in a general sense of home vs. educational. Social learning effects can be controlled for in the home environment but may not be in the school environment.

Approval: No statement of ethics approval. Written consent was obtained from teachers and parents after discussion and provision of written details.

Measures & Materials: The target behaviour (dependent variable) was the frequency of in toilet urinations per day during 4 phases of the study. Multiple measurements across environments were taken by more than one caregiver and all were supplied with written procedures and instructions. No inter-rater reliability discussed or monitored. However, the target behaviour is an observable outcome requiring no specialized training or knowledge.

Interventions: The treatment group watched a 6 minute commercially produced video model prior to the toileting routine. Both the treatment and control groups during the intervention phase were: taken to the bathroom on their baseline schedule, 6- 7 times a day, with scripted prompting, reinforcers (determined with an established procedure) provided for each itemized step. Caregivers received training and written information about the intervention with follow-up by phone 1 time a week. Procedural fidelity was not evaluated and differences in reinforcements and amount/level of prompting may confound results. However, the independent variable was controlled during the phases. The ability to replicate the intervention with other students would be possible with the information provided. Order of intervention effect was controlled for by staggered onset and treatment phases.

Analysis: Visual representations of the results were provided across subjects, groups and phases but the data collected was not separated into the two settings of home and school. Target behaviour levels increased in the treatment phases compared to baseline.

**INTERPRETATION OF RESULTS:**

Visual analysis of the data demonstrated a causal relationship between VM & operant conditioning techniques and frequency of in toilet urination from a stable baseline. Graphs

included a clear X, Y axis, onset and phase delineations were evident. Bar graphs were used

to further represent the findings for participant groups. External validity is strong due to

multiple replications between participants. Generalization of these results to the ASD

population is possible with the information provided. Confounding factors to be considered in

this study include developmental progress, regression in skills due to change in routines,

changes in medication, change in caregiver administering intervention and practice effect.

**SUMMARY:**

Overall, this study demonstrated sound methodology for the research question and

population. A treatment effect was demonstrated for video modelling in conjunction with

behavioural strategies improving in toilet urination for children on the autism spectrum. This

paper achieved moderate quality on the (Logan et al., 2008) scale and met criteria on the

SCRIBE checklist indicating it may be generalizable to other students with ASD.

**IMPLICATIONS FOR PRACTICE, EDUCATION and FUTURE RESEARCH**

This study was chosen as best evidence for my PICO question and it provided the evidence to

answer my question. Video modelling (VM) in conjunction with behavioural strategies

improves toileting outcomes for children with ASD. In my practice as a school based

occupational therapist many strategies and interventions are used for toilet training students

as it is a complex activity with many external variables like timing, caregivers, prompting,

rewards and internal variables like cognition, fine motor skills and language skills. Using a

VM to assist toilet training students with ASD enables clinicians to have control over an

important variable and uses a relative strength in visual processing for learning. Other

research has explored animated VM components for teaching intimate areas that cannot be

peer modelled (McLayet al. ,2015), chaining VM to teach step by step skills (Drysdale et al.,

2015) teaching daily living skills like tying shoes (Meister et al., 2015) and can be combined

with other interventions (Keen et al., 2007). Further research could explore the relevance of updating the VM as discrete steps of toilet training achieved. Updating the video may encourage intentional targeting of the skills remaining to be learned and increase relevance of the VM for the child. VM provides a stable & predictable model for toilet training and has possibilities in many areas of occupational therapy.

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