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Effects of Video Modeling on Socialization in Children and Adolescents with Autism Spectrum Disorder

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Disciplines
Occupational Therapy

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Effects of Video Modeling on Socialization in Children and Adolescents with Autism Spectrum Disorder

Prepared by: Amy Gwilliam, OTS (gwil7293@pacificu.edu)
Date: 10/25/2011
Review date: October 2013

CLINICAL SCENARIO:

One of the hallmarks of Autism Spectrum Disorder (ASD) is a deficit in social skills. This population has grown to 1 in 110 children in the U.S. (Centers for Disease Control and Prevention, 2010), and occupational therapists have many opportunities to work with this population. Because social participation is listed as an area of occupation in the Occupational Therapy Practice Framework (American Occupational Therapy Association, 2008), it is important that practitioners provide interventions that specifically target the social deficits that are observed in children and adolescents with ASD. According to Njardvik, Matson, and Cherry, if socialization is not addressed in the younger years of life, deficits may persist into adulthood (as cited in Nikopoulos & Keenan, 2007).

There are many interventions available to use. Video modeling is one type of intervention that does not seem to be well known or researched. It is a technique that requires video equipment for recording and displaying visual models, and is typically used to teach desired behaviors or skills (National Professional Development Center on Autism Spectrum Disorders, 2011). There are many types of video modeling, the basic type involves recording a person performing a target behavior or skill, and then the video is watched by whoever may need to learn the specific behavior. Another type is video self-modeling, which involves the person intended to learn specific behaviors performing those successfully while being recorded (2011).

Studies by Corbett and Charlop-Christy et al. have found that the television can be a motivating factor for children with ASD (as cited in Cardon & Wilcox, 2010), which is one reason why this intervention may prove to be an effective way to increase socialization in this population. Due to lack of knowledge and research thus far, this CAT explores the intervention’s effects on socialization.

FOCUSED CLINICAL QUESTION: How can video modeling impact socialization in children and adolescents with Autism Spectrum Disorder (ASD)?

SUMMARY of Search, ‘Best’ Evidence’ appraised, and Key Findings:

- The writer reviewed five articles studying the effects of video modeling on socialization in children and adolescents with ASD.
- The meta-analysis by Bellini and Akullian (2007) appears to be the ‘best’ evidence out of the five that were analyzed.
- The authors found 23 multiple-baseline designs that met their criteria. There
were numerous categories that were evaluated for each study, and they used three reviewers to ensure methodological quality. The population and intervention in the studies chosen match the writer’s clinical question. The meta-analysis focused on outcomes related to behavioral functioning, functional skills, and social-communication skills, which also relates to the question.

- The overall results of the meta-analysis found that video modeling and video self-modeling are “effective strategies for targeting social-communication skills, functional skills, and behavioral functioning,” (Bellini & Akullian, 2007, p. 270).
- In three out of the four other studies found, video modeling was shown to be effective in teaching social behaviors, such as eye contact and initiations.
- The last study selected found that the targeted social responses occurred more after the second phase of treatment, indicating a learning effect.
- The writer found it interesting that in the meta-analysis, and in the other articles found, further research is suggested on the effects of video modeling. Each study had various limitations that made the results less valid, and the sample size of studies in the meta-analysis was not considered large enough to be fully comprehensive.

CLINICAL BOTTOM LINE: Research shows that video modeling can be an effective technique for increasing socialization in children and adolescents with ASD. This intervention utilizes knowledge about social interactions and behaviors, and combines that information with a media that has been observed to be motivating in this population. It is an attainable and relatively quick treatment to administer that can be used in a variety of settings. Given the increases of technology in this country, it should be easy to teach this intervention to practitioners who have a basic understanding of video recording and playing.

Limitation of this CAT: This critically appraised topic has been peer-reviewed by other MOT students, but was not externally reviewed and is not exhaustive.

SEARCH STRATEGY:
Terms used to guide Search Strategy:

- **Patient/Client Group:** Children/adolescents with ASD
- **Intervention (or Assessment):** Video modeling
- **Comparison:** N/A
- **Outcome(s):** Socialization, increase in social skills/behaviors/participation
### Databases and sites searched

<table>
<thead>
<tr>
<th>Databases and sites searched</th>
<th>Search Terms/Limits Used</th>
<th>Articles Found</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEDLINE (9/5/2011)</td>
<td>“Video modeling” combined with (AND) “socialization”/ English, full-text, within last 10 years</td>
<td>Yielded 11 results, only 1 related, but not critically appraised. White, S. W., Keonig, K., &amp; Scahill, L., (2007), <em>Journal of Autism &amp; Developmental Disorders</em></td>
</tr>
<tr>
<td>PsycINFO (10/6/11)</td>
<td>“Meta-analysis of video modeling”/ full-text articles, within last 10 years, English, peer reviewed</td>
<td>Bellini, S. &amp; Akullian, J. (2007), <em>Exceptional Children</em> This was the only result.</td>
</tr>
</tbody>
</table>

### INCLUSION and EXCLUSION CRITERIA

- **Inclusion:** Asperger’s, autism, ASD, peer-reviewed articles, English, meta-analyses, children, adolescents, video modeling, other interventions, such as Social Stories, in vivo modeling, and reinforcement contingencies

- **Exclusion:** Adults, non-English, older than 11 years
RESULTS OF SEARCH
Five relevant studies were located and categorized as shown in Table 1 (Tomlin & Borgetto, 2011).

Table 1: Summary of Study Designs of Articles retrieved

<table>
<thead>
<tr>
<th>Study Design/ Methodology of Articles Retrieved</th>
<th>Level</th>
<th>Number Located</th>
<th>Author (Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meta-Analysis</td>
<td>I</td>
<td>One</td>
<td>Bellini &amp; Akullian (2007)</td>
</tr>
</tbody>
</table>

BEST EVIDENCE
The following study/paper was identified as the ‘best’ evidence and selected for critical appraisal:


Reasons for selecting this study were:
- Highest level of research design found
- Most relevant to PICO question
- The authors used multiple strategies to find studies about this intervention
- There was 100% agreement between reviewers for methodological quality evaluation of studies

SUMMARY OF BEST EVIDENCE


Aim/Objective of the Meta-Analysis: The study’s aim was to collect and analyze the existing research and outcomes of studies on video modeling (VM) and video self-modeling (VSM) on children and adolescents with ASD. The authors also want to study the intervention, maintenance, and generalization effects of the two treatments for three categories: social-communication skills, functional skills, and behavioral functioning.
Study Design: Meta-Analysis

Search Strategy: The authors looked for articles between 1980 and 2005 using the databases ERIC and PsycINFO, and used these terms: “autism, autism spectrum disorder, ASD, pervasive developmental disorders, PDD, Asperger’s, Asperger’s syndrome, video modeling, videotape modeling, video self-modeling, videotape self-modeling, VSM, self-modeling, video technology, and video feedforward.” (Bellini & Akullian, 2007, p. 267). The authors searched for studies using the references lists of each study found in ERIC and PsycINFO. Also, they used the Ayres & Langone (as cited in Bellini & Akullian, 2007) review to find any studies not in the databases used, and manually looked through Focus on Autism, Journal of Autism and Developmental Disorders, and Exceptional Children.

Selection Criteria:
Population: Must have ASD, between ages 3 to 20
Interventions: Studies must have tested the effectiveness of VM or VSM alone or in combination with other intervention techniques.
Results/Outcomes: Behavioral functioning, functional skills, and social-communication skills; “dichotomous dependent variables (e.g. yes/no, correct/incorrect) with fewer than 3 probes or questions per data point were excluded from analysis because they could not be logically and/or intuitively interpreted by the metric employed in the meta-analysis (i.e. percentage of overlapping data points)” (p. 267).
Study design: Must have been single-subject research designs, showing experimental control, such as multiple-baseline

Studies also needed to be peer-reviewed, in English, and display data in graphs that showed individual data points rather than grouped data, to determine intervention effectiveness.

Intervention Investigated: Video modeling (VM) and video self-modeling (VSM)

Outcome Measures: Intervention, maintenance, and generalization effects of VM and VSM on social-communication skills, functional skills, and behavioral functioning were the dependent variables in this meta-analysis. The authors used percentage of non-overlapping data (PND) analysis, which is useful for determining intervention effectiveness and “systematically synthesizing single-subject research studies,” according to Mastropieri & Scruggs (as cited in Bellini & Akullian, 2007, p. 268). If PND scores are above 90, the intervention is very effective; between 70 and 90 is effective; 50 and 70 is questionable, and below 50 means the intervention is ineffective. Scores were calculated for each participant and dependent variables in all 23 studies. The three dependent variables were defined as (p. 269):
- Behavioral functioning: reduction in problem behaviors and off-task/on-task behaviors
- Social-communication skills: conversational skills, play skills, social initiations and social responses
- Functional skills: purchasing behaviors, hygiene, and self-help skills
Main Findings: All figures below were produced by the writer, making the authors’ results easier to read because they were listed in paragraphs in the original article.

Figure 1. The types of studies that the authors included in the meta-analysis

<table>
<thead>
<tr>
<th>Multiple Baseline Only</th>
<th>Multiple Baseline &amp; Changing Conditions</th>
<th>Multiple Baseline &amp; Alternating Treatment</th>
<th>Multiple Baseline &amp; Reversal Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 2. PND scores for each study

<table>
<thead>
<tr>
<th>Variables (# of studies)</th>
<th>Intervention Effects (determined by measuring how effective intervention was for each variable)</th>
<th>Maintenance Effects (measured by calculating between baseline and the maintenance or reversal phase)</th>
<th>Generalization Effects (calculated for studies that looked at effectiveness of intervention across persons, settings, skills/behaviors)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social-Communication (16)</td>
<td>Mean PND= 77% Range= 29-98</td>
<td>Mean PND= 78% Range= 35-100</td>
<td>Mean PND= 70% Range= 22-100</td>
</tr>
<tr>
<td>Functional Skills (8)</td>
<td>Mean PND= 89% Range= 43-100</td>
<td>Mean PND= 100%</td>
<td>Mean PND= 97% Range= 94-100</td>
</tr>
<tr>
<td>Behavioral Functioning (3)</td>
<td>Mean PND= 76% Range= 42-95</td>
<td>Mean PND= 82% Range= 63-100</td>
<td>No studies measured this</td>
</tr>
</tbody>
</table>

Figure 3. PND scores for 15 studies that did VM and the 7 studies that focused on VSM

<table>
<thead>
<tr>
<th>Intervention Type</th>
<th>Intervention Effects</th>
<th>Maintenance Effects</th>
<th>Generalization Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>VM</td>
<td>Mean PND= 81% Range= 29-100</td>
<td>Mean PND= 88% Range= 50-100</td>
<td>Mean PND= 82% Range= 22-100</td>
</tr>
<tr>
<td>VSM</td>
<td>Mean PND= 77% Range= 43-96</td>
<td>Mean PND= 71% Range= 35-100</td>
<td>Mean PND= 65% Range= 25-94</td>
</tr>
</tbody>
</table>

The main findings of the PND analysis suggested that functional skills were highest for intervention, maintenance, and generalization effects, but the authors state that it is “premature to conclude that video modeling and VSM interventions are most effective in teaching functional skills to children and adolescents with ASD.” (p. 283). PND scores of 70 to 90% have moderate intervention effects, and according to the analysis and figures above, social-communication skills and VM were at the moderate level. However, the authors wrote a disclaimer to make comparisons with caution. One can determine whether the intervention is effective by observing that most of the scores were in the moderate or effective range, except maintenance and generalization.
effects for functional skills was in the higher, very effective stage, and generalization for VSM was in the slightly lower, questionable stage.

Original Authors’ Conclusions:
The results show that VM and VSM were effective in helping children and adolescents acquire social skills and behaviors. Those skills transferred over to other settings, when other people were present, and after a few months of receiving the interventions, which were measured by observing behavior in schools and at home and providing caregiver surveys. VM is helpful for educators and therapists who are constantly struggling with having enough time to provide effective treatments to all of their clients because each session only takes a few minutes, and approximately less than 10 sessions are needed. One reason for the effectiveness of these treatments is because they use visually cued instructions with modeling, which have been shown to be helpful with children and adolescents with ASD. Other reasons why VM is effective are that attention can be solely focused on the videos, distractions are decreased or eliminated, and watching videos takes away any anxiety or distress that may be had during human interactions. Also, based on anecdotal evidence, motivation and attention for watching videos is high among this population because it is a greatly desired activity.

Critical Appraisal: The first limitation noted by the writer is that the authors did not use a box and whisker plot to display results. This may be due to the type of analysis they used, which was PND scores, and also because of the type of studies chosen and data that those studies found. The authors stated that caution should be used in making comparisons across outcome variables and generalization effects when comparing VM and VSM due to the small number of studies that were analyzed and the types of outcome measures varied across the studies. Overall, the meta-analysis had a small number of studies to be considered fully comprehensive.

Social validity and intervention fidelity requires further research because there is potential that this type of treatment is resisted or rejected due to lack of knowledge about the technology used, and whether the child or adolescent is focusing attention on the video. The authors found that only a few of the studies measured social validity and intervention fidelity, but reported that it would be relatively simple to implement these measurements in future studies.

Validity/Methodological Rigour:
Each study selected for the meta-analysis was reviewed based on several categories, such as characteristics of participants (age, diagnosis) and interventions (setting, number of treatments, length of sessions), independent and dependent variables, intervention, maintenance, and generalization effects, and whether each study found reliability and social validity. The authors clearly explained why they excluded a particular study, and determined to what extent the chosen studies were reliable and valid.

Two people independently coded each study and compared results, establishing interrater agreement of 98%. Due to the type of analysis chosen for this meta-analysis (percentage of non-overlapping data or PND), they did another test on 10 of the 23 chosen studies to ensure accuracy of their calculations, getting 70% agreement, but after re-calculation by the 2 people, they had 100% agreement. On the remaining 13 studies, the PND agreement was 100%. On 13 randomly selected studies, another
independent reviewer used the same coding system and PND calculations, following
the same procedures, yielding a mean interrater agreement of 100% between all 3
reviewers.

**Interpretation of Results:** The meta-analysis found studies that differed in age of
population, from 3 to 20, which was necessary to answer the question regarding
children and adolescents. There were slight differences in the type of research design
used, but they all fell under the same category, being single-subject research.
Interobserver reliability was found in 22 out of the 23 studies, which appeared to be
the most reliable test for the type of research design that each study used. However,
only 4 of the studies measured social validity. Also, there were differences between
the amounts of exposure to the intervention, but the Kruskal-Wallis procedure found
no statistically significant differences between the 23 studies. Due to the lack of
research that has been done on this topic, it may have been necessary for the authors
to include studies that had slight differences, in order to complete a meta-analysis that
met their objectives. The ranges listed in the main findings show inconsistencies in the
results for each study analyzed. It seems logical that the results would vary because
there were slight differences between each study analyzed.

**Summary/Conclusion:** The purpose of this study was to determine how effective VM
and VSM are for teaching children and adolescents with ASD social-communication
skills and other skills because it is important to have evidence that supports what
clinicians do in practice. There are still many unknowns about the most effective
interventions for this population, but the authors did find that video modeling is a
promising intervention technique for addressing social skills, among others, in various
settings. However, further research is needed to determine the efficacy and social
validity for the intervention technique, and factors that lead to benefits for this
population.

Table 3: Characteristics of included studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Intervention investigated</th>
<th>Comparison intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baharav, E. &amp; Darling, R. (2008)</td>
<td>Study was designed to test whether caregiver video modeling, along with an auditory trainer, would increase social skills in one child with autism.</td>
<td>None</td>
</tr>
<tr>
<td>Scattone, D. (2008)</td>
<td>To measure the effect of combining Social Stories and video modeling on increasing conversational skills in a child with Asperger’s Disorder.</td>
<td>None</td>
</tr>
<tr>
<td>Gena, A., Couloura, S. &amp; Kymissis, E. (2005)</td>
<td>To assess how in vivo modeling can modify the affective behavior of three children with autism because appropriate affect has an impact on socialization.</td>
<td>Video modeling with reinforcement contingencies</td>
</tr>
<tr>
<td>Outcomes used</td>
<td>1. Latency system- Social initiation and imitative response</td>
<td>1. The Autism Diagnostic Observation Schedule-generic</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------------------------------------------------------</td>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>2. Social validity measured using survey with mothers of typically developing peers</td>
<td>2. MacArthur Communicative Development Inventory: words and gestures</td>
</tr>
<tr>
<td></td>
<td>3. Generalization measured by doing in vivo modeling</td>
<td>3. Vineland Adaptive Behavior Scale</td>
</tr>
<tr>
<td></td>
<td>4. Interobserver agreement by having one observer blind to conditions.</td>
<td>4. Video analyses of free play for 6 minute segments to see how often focus of attention was on people vs. objects</td>
</tr>
</tbody>
</table>

| Findings | Video modeling was successful in teaching sequences of social behavior, generalization and social validity was demonstrated. However, due to limitations, it is still unclear | The treatment combining video modeling and auditory trainer had a "significant effect on the subject's communication and socialization behaviors," (p. | The combined treatment was found to be effective in increasing the subject's eye contact and initiations, 2 of the 3 aspects of conversational skills that the | For each treatment session after the second phase, whether video modeling or in vivo was used first, the target responses occurred slightly faster after second phase, |

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| whether it would be effective outside of lab setting. | 773), and they recommend further research on this type of treatment. | authors focused on. | most likely due to learning from first phase. |

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

- This type of intervention has shown increased social skills and can be used in a school, home, and/or clinical setting, as long the necessary equipment for recording and playing videos is available. One implication is that a clinician or educator who wants to use this type of treatment has to learn how to use the required equipment, but there are alternatives, such as buying previously made videos. They can be bought on various websites, are cost-effective, and easy to use.

- Some positive implications for practitioners include: Having a quick technique for teaching other skills besides social, more time to see clients and talk with clients’ family’s because treatment sessions do not take as long as other types of interventions, and it is a highly customizable technique.

- The studies did not report any adverse effects from this intervention. A possible negative aspect is that “recording the behaviors of child peers requires further consent from parents and additional time to train the peers to successfully perform the target behavior and to ensure their full cooperation and participation,” (Bellini & Akullian, 2007, p. 285). If the video is made with peers, it will be more time consuming due to further training and consent being required, but the advantage of using peers is possible increased effectiveness of the intervention.

- This intervention would be easy to add into the curriculum in occupational therapy schools because it is a fairly simple concept of using video technology that expands on the knowledge of other social interventions, such as Social Stories. It also relates to various models of practice, such as the Model of Human Occupation, when considering motivating factors in certain populations, such as children with ASD.

- More research is needed in order to be considered evidence-based practice and for practitioners to be reimbursed for their services. Presentations and pamphlets can be given at insurance companies so they know that this is an intervention that should be paid for. If practitioners are relying on parents of possible clients to pay them, they need to provide evidence to the parents as well. Once this type of intervention becomes more widespread and recognized as being effective, it should start being included in continuing education courses.
REFERENCES


**CAT Grading Criteria: Overall Score** 14.75  
Score is low since some pieces are missing. Need other 4 studies in bullets for clinical scenario and search strategy. Also need implications for education. Consider edits before posting to the web.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Weight</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 3 2 1 0</td>
<td>20%</td>
<td>Clinical scenario, Clinical question, Summary/key findings, Bottom line statement are clear, succinct, and comprehensive. Needs bulleted highlights of the other 4 studies and needs a definitive bottom line statement about the CAT as a whole.</td>
</tr>
<tr>
<td>4 3 2 1 0 2.5</td>
<td>10%</td>
<td>Search strategy, PICO, Inclusion/exclusion criteria are relevant, clear, and comprehensive. Reader could easily follow your trail. Where are other 3 articles in the Levels?</td>
</tr>
<tr>
<td>4 3 2 1 0</td>
<td>20%</td>
<td>Results of Search, Summary of information retrieved is comprehensive and accurate. Research article reflects highest level of evidence available. Reasons for selection are comprehensive and accurate. Sufficient details from studies’ results are included and accurate. Details from studies’ are accurate. Irrelevant information is not included. Nice mix of articles to support the CAT. Different titles for same intervention confounds your comparison.</td>
</tr>
<tr>
<td>4 3 2 1 0</td>
<td>20%</td>
<td>Best evidence, Rationale for selection of best evidence is identified.</td>
</tr>
<tr>
<td>Objective</td>
<td>Rating</td>
<td>Percentage</td>
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</tr>
<tr>
<td>Appraisal of study is accurate and comprehensive</td>
<td>4 3 2 1 0</td>
<td>20%</td>
</tr>
<tr>
<td>Some concepts in the best evidence need additional explanation. Author’s conclusions need paraphrasing. Numbers in the figures are unclear and would benefit by additional narrative or narrative that fits in between them or has direct reference to them to best support how VM is a benefit.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add implications, suggestions for education.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>References</td>
<td>4 3 2 1 0</td>
<td>10%</td>
</tr>
</tbody>
</table>