# NCAEP

## Null Findings Summary

The National Clearinghouse on Autism Evidence & Practice

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UNC FRANK PORTER GRAHAM CHILD DEVELOPMENT INSTITUTE

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## Null Findings Summary

This summary was created as a companion document to the National Clearinghouse on Autism Evidence and Practice (NCAEP) systematic review article and report (see Hume et al., 2021; Steinbrenner et al., 2020; https://ncaep.fpg.unc.edu/). In that article and report, we provide supporting evidence for identified practices using studies with positive effects. We did not, however, describe practices for which studies demonstrated an absence of evidence or null effects. The objective of this document is to summarize the null findings discovered during our systematic review from 1990–2017.

An earlier version of this report referred to Ayres Sensory Integration(R) (ASI) as Sensory Integration(R) (SI). To clarify the practice for which our review found evidence, we have updated the terminology in this report to ASI and updated the null findings to differentiate between ASI and sensory diet.

## Null Findings Definition

Null findings are defined in this document as "no experimentally determined differences on any of the targeted outcomes between the intervention/treatment condition and a control/contrast condition". In the included studies, the experimental methodology meets our quality criteria, and thus studies are designed well enough to detect an effect if it were present. We further defined null findings for the two types of designs included in the review:

### Group Design Null Findings Definition

- No statistically significant difference at the $p<.05$ level between the intervention and control groups on any examined dependent variables.
- For treatment comparison studies, there must also be a control group that was no treatment, delayed treatment or services-as-usual.

### Single Case Design Null Findings Definition

- Fewer than three demonstrations of substantial changes (i.e., changes in level, trend, and/or variability) in the targeted outcomes when the intervention condition is implemented and/or withdrawn.
- For **withdrawal of treatment designs (ABAB)**, the change does not occur from a baseline to treatment condition and/or from the treatment to subsequent baseline condition (i.e., a decrease in performance when the treatment is removed).
- For **multiple baseline or multiple probe designs**, the change does not occur when the treatment condition is implemented after the baseline condition (i.e., fewer than three demonstrations).
- For **alternating treatment designs**, there must be a design that allows for experimental control between the baseline and the treatments (e.g., design is combined with multiple baseline or ABAB, baseline is one of the alternating treatments) – AND - there is not a clear difference in performance between a baseline phase implemented before the alternating treatments are implemented OR when there is not a clear difference between treatments including the baseline comparison.

## Process of Extracting Null Findings

Our team re-reviewed the articles that had been excluded from the 2012-2017 review during our internal review phase of the independent variables (n=148), as well as all articles that had been identified by external reviewers as having "no effects"(n=65). In addition, studies with reported null findings from the 1990-2011 review period (n=83) were reviewed.

From these 296 studies that were re-reviewed by the NCAEP team, 58 were found to have null findings per our definitions above. Most of the articles were single case designs (n=47) and 11 were group designs. Ten articles were from the 1990-2011 review and 48 were from the 2012-2017 review period. The other studies (n=238) were identified as (a) a treatment comparison study without a no-intervention control, (b) a parameter analysis without a no-intervention control (e.g., robot delivered vs. human delivered intervention), (c) not meeting study quality criteria (e.g., having only two potential demonstrations of effect for a single case design study).

**Figure 1. Number of articles with null effects included for each review period**

## Summary of Null Findings

Interpreting null findings is challenging and requires nuanced considerations. A null finding may not mean that a practice does not work for some individuals on some outcomes, or that it should necessarily "count against" a previously established EBP. Rather, that under the experimental controls in a particular study, the practice is not significantly more effective than the control condition. Null findings also do not indicate that these interventions hurt or contribute to negative outcomes for participants. It is important to note that our review only examined effects on participants from birth to 22 years with a diagnosis of autism. There were instances where positive effects were found for parent participants (e.g., Harrop et al., 2016) but null effects for child participants in a parent-implemented intervention (PII). It is also possible that these practices are effective for older adults with autism or individuals with diagnoses other than autism but had null effects for individuals in our review population.

The 58 articles with null findings examined 24 intervention practices. Most of these practices (22 of the 24) were identified as EBPs in the larger review of positive intervention effects. Art-mediated intervention and sensory diets were the only practices found in the null findings review that have not qualified as an EBP. Notably, the sensory diet study (Moore et al., 2015) called the intervention „sensory integration" but it was not Ayres Sensory Integration®. Table 1 summarizes the practices, their null findings, and the participant outcomes for which the practices had null effects. Note that, just as in our review of positive effects, some studies count toward multiple practices if the intervention implemented used multiple practices.

There were some practices within EBP categories that had substantial evidence of null effects with individuals with autism. For instance, within Antecedent-Based Interventions (ABI), five of the nine identified studies reported null effects for "deep pressure therapy" (e.g., Losinski et al., 2017) including weighted vests (Leew et al., 2010; Watkins et al., 2014), weighted blankets (Gringas et al., 2014), and wrist weights (Demanche et al., 2013) for challenging and interfering behavior outcomes. One of these was a randomized controlled study (Gringas et al., 2014) finding null effects for weighted blankets on sleep outcomes. Collectively, these null findings provide substantial evidence against use of deep pressure therapy for challenging and interfering behavior.

In addition, multiple foundational EBPs (e.g., Prompting, Reinforcement, Visual Supports) have some evidence of null effects, as do two EBPs that recently met review criteria as EBPs (i.e., Music-Mediated Intervention, Sensory Integration®). This may demonstrate the variability of individuals with autism and how practices must be individualized to meet specific needs. Even foundational practices do not have positive effects with all individuals with autism for all goals/outcomes and group interventions almost certainly have non-responders, even in studies with significant effects.

## Discussion

Studies with null findings are subject to publication bias and thus are less likely to be published than studies with positive effects. Therefore, it is possible that there are additional null findings not available for review. A promising trend in the field, in an effort to address this publication bias, is the identification of nearly five times more published null findings in the 2012–2017 review as those found in the 1990–2011 review.

Null finding literature can be particularly valuable in studies of treatment comparison or parameter analysis where the results can provide critical information in identifying what interventions are most effective for whom and under what circumstances. Given the breadth of the autism intervention literature, selecting EBPs to meet the goals of individual students is a daunting task. This summary of null findings is an additional tool that can assist practitioners and researchers in that process.

**Table 1. Practices, Number of Studies and Outcomes with Null Effects and Positive Effects**
Note: See full report, Table 3.1 on pp. 28–29

| Intervention Practice | Number of Studies with Null Findings | Number of Studies with Positive Effects | Student outcome(s) for which the practice had null effects |
|---|---|---|---|
| Antecedent Based Interventions (ABI) | 9 | 49 | Joint attention, Challenging/ interfering behavior, School readiness |
| Augmentative and Alternative Communication (AAC) | 5 | 44 | Communication, Social |
| Art-Mediated Intervention | 1 | 0 | Social |
| Cognitive Behavioral/ Instructional Strategies (CBIS) | 2 | 50 | Challenging/interfering behavior, Academic/pre-academic |
| Differential Reinforcement of Alternative, Incompatible, or Other Behavior (DR) | 2 | 58 | Challenging/interfering behavior, Social |
| Discrete Trial Training (DTT) | 3 | 38 | Communication, School readiness |
| Exercise and Movement (EXM) | 2 | 17 | School readiness, Motor, Social |
| Extinction (EXT) | 2 | 25 | Communication, Challenging/ interfering behavior |

| Intervention Practice | # of null findings | # of positive findings | Student outcomes with null findings |
|---|---|---|---|
| Functional Communication Training (FCT) | 1 | 31 | Communication |
| Modeling (MD) | 2 | 28 | Academic/pre-academic, Play, Challenging/interfering behavior |
| Music-Mediated Intervention (MMI) | 2 | 7 | Social |
| Naturalistic Intervention (NI) | 1 | 75 | Challenging/interfering behavior, Social |
| Parent Implemented Intervention (PII) | 4 | 55 | Joint attention, Social, Challenging/interfering behavior |
| Peer-Based Instruction and Intervention (PBII) | 2 | 44 | Social, Communication, Challenging/interfering behavior |
| Prompting (PP) | 7 | 140 | Academic/pre-academic, Play, Challenging/interfering behavior, Communication, Adaptive/self help, School readiness, Social |
| Reinforcement (R) | 8 | 106 | School readiness, Challenging/interfering behavior |
| Response Interruption and Redirection (RIR) | 1 | 29 | Challenging/interfering behavior |
| Self Management (SM) | 1 | 26 | Social |
| Sensory Diet | 1 | 0 | Challenging/interfering behavior |
| Social Narratives (SN) | 2 | 21 | Social, Communication |
| Social Skills Training (SST) | 1 | 74 | Social |
| Technology Aided Instruction and Intervention (TAII) | 8 | 40 | Communication, Play, Social, Cognitive, Motor, School readiness |
| Video Modeling (VM) | 3 | 97 | Adaptive/self help, Social |
| Visual Supports (VS) | 2 | 65 | Challenging/interfering behavior, Social, Communication |

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**Antecedent Based Interventions (ABI)**

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**Social Skills Training (SST)**

Reilly, C., Hughes, C., Harvey, M., Brigham, N., Cosgriff, J., Kaplan, L., & Bernstein, R. (2014). "Let's Talk!": Increasing Novel Peer-Directed Questions by High School Students with Autism to Their General Education Peers. *Education and Training in Autism and Developmental Disabilities*, 214-231.

**Technology Aided Instruction and Intervention (TAII)**

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