

# *Meta-Analysis of the Effects of Puppet Shows on Attitudes Toward and Knowledge of Individuals With Disabilities*

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**ABSTRACT:** *Findings from a meta-analysis of 26 studies investigating the effects of either the Kids on the Block or Count Me In puppet shows on changes in elementary students' attitudes toward and knowledge of individuals with disabilities are reported. The studies included 5,302 intervention group participants and 2,642 comparison group participants. Results indicated that the puppet shows had small to medium effects on changes in the participants' attitudes and knowledge, and that the sizes of effect were moderated by a number of intervention- and nonintervention-related variables. Both the strengths and limitations of the meta-analysis are described as well as are the implications for practice.*

**C**hanging people's attitudes toward and knowledge of individuals with disabilities has been a focus of research and practice for many years (Donaldson, 1980; Jones, 1984; Yunker, 1988). This includes efforts to change elementary students' attitudes toward and knowledge of children with disabilities (Jones, Sowell, Jones, & Butler, 1981; Simpson, Parrish, & Cook, 1976; Van Westervelt, Brantley, & Ware, 1983). Despite advances in understanding the factors and conditions contributing to positive attitudes and accurate knowledge of typically developing children toward classmates with disabilities, investigations continue to yield evidence to indicate that misunderstandings and negative attitudes persist (Gash,

1996; Livneh, 1991; Scior, Kan, McLoughlin, & Sheridan, 2010).

Many different types of intervention have been used to influence changes in the attitudes toward and knowledge of individuals with disabilities (Donaldson, 1980; Garcia, Diaz, & Rodriguez, 2009; Hannon, 2007). Garcia et al. examined the literature on eight types of interventions aimed at changing attitudes including, but not limited to, (a) increased personal contact between individuals with and without disabilities, (b) provision of information designed to promote accurate understanding of individuals with disabilities, (c) the use of participatory experiences to engage individuals with and without disabilities in mutually interesting activities (e.g., scouts, sports), (d) interpersonal skill and empathy-

related training, and (e) engaging children without disabilities in simulations of disabling conditions. The investigators concluded that contact between individuals with and without disabilities, provision of information about individuals with disabilities, and mutually interesting cooperative activities between individuals with and without disabilities were most effective in fostering positive attitudes.

One method used to change attitudes toward and knowledge of individuals with disabilities among elementary-aged children is puppetry (Gronna, Serna, Kennedy, & Prater, 1999; Pitre, Stewart, Adams, Bedard, & Landry, 2007). According to a number of advocates (e.g., Aiello, 1988; Bernier & O'Hare, 2005; Leggett, 2005; Samples, 1981), puppet shows constitute a promising approach for changing attitudes and knowledge because they can reach large numbers of students at a relatively low cost. Two of the most widely used puppet programs are the *Kids on the Block* puppet troupe (Aiello, 1988; Kids on the Block Inc., 2012) and the *Count Me In* puppet troupe (Goldberg et al., 1981; PACER Center, 2011). Both of the original puppet troupes, which include puppets representing children with a physical disability, intellectual disability, visual impairment, and hearing impairment, have been the focus of extensive empirical investigation. The puppet shows include scripts for each puppet designed to promote awareness of the different disabilities, communicate misconceptions about each child's condition, provide accurate information about each child's abilities and disability, and allow for a question-and-answer period after the completion of a puppet show. A typical puppet show lasts approximately 45 minutes followed by a 15-min question-and-answer period.

The effectiveness of using puppet shows to change attitudes and knowledge has been questioned by some investigators (e.g., Rosenbaum, Armstrong, & King, 1986b), whereas others contend that puppet shows are an effective method for achieving attitude and knowledge change (e.g., Aiello, 1988). The debate, however, has not been resolved by a systematic review of studies of either the *Kids on the Block* or *Count Me In* puppet shows. The purpose of the meta-analysis described in this article was to synthesize findings from studies of both puppet troupes and to iden-

tify the conditions under which puppet shows were or were not effective in changing elementary students' attitudes toward and knowledge of individuals with disabilities. The need for a meta-analysis is based on the fact that puppet shows are used extensively throughout the United States (see Schumacher, 1998), Canada (see Baker, 1991), and 30 other countries (Leggett, 2005) to change the attitudes and knowledge of elementary students, yet studies of the effectiveness of puppet shows have never been synthesized.

## METHOD

### SEARCH STRATEGY

Studies were located using the search terms: (*Kids-on-the-Block* OR "*Kids on the Block*" OR *KOB* OR *KOTB* OR "*Count Me In*" OR *PACER puppet* OR "*PACER and puppet*" OR *Count Me In Project* OR *puppet*) AND (*research* OR *evaluate* OR *study* OR *investigate*) AND (*elementary* OR *elementary school* OR *primary school* OR *elementary grade* OR *primary grade*). ERIC, Medline, PsycINFO and REHABdata were searched to identify studies. These were supplemented by searches of Google Scholar, Google, and Scirus as well as an End-Note library maintained by our Institute. The reference sections of all retrieved journal articles, book chapters, books, dissertations, and other published and unpublished reports were examined to identify additional studies. Studies were also located by contacting investigators of unpublished studies to obtain research reports which were not available through other sources.

Studies were included if (a) a repeated measures design was used to estimate the effects of the puppet shows, (b) the students attending and not attending the puppet shows were administered an attitude or knowledge measure on a pretest-posttest basis, (c) the means and standard deviations for computing change scores were included in the research reports or change scores could be estimated from information in the research reports, and (d) the time between the pretests and posttests were identical for participants in the same study. Studies were excluded if only descriptive or qualitative findings were reported (Hickey & O'Leary, n.d.) or if incomplete information

was included in the research report to calculate effect sizes (Rosario, 2011). Studies of the effects of puppet shows on attitudes toward or knowledge of child conditions other than those that were the focus of this meta-analysis (intellectual, physical, or sensory disabilities) were also excluded (e.g., Pitre et al., 2007).

#### SEARCH RESULTS

Twenty-six studies were located in 18 research reports. Seventeen studies were intervention and comparison or control group investigations, and nine studies were pretest-posttest investigations. The investigators employed independent-groups pretest-posttest ( $n = 16$ ), independent-groups posttest ( $n = 1$ ), and one-group pretest-posttest ( $n = 9$ ) study designs. The participants in the independent-group studies were randomly assigned to groups at the individual, classroom, or school levels ( $n = 12$ ) or the method of group assignment was not specified ( $n = 5$ ). The comparisons between the intervention and control group participants in the independent-group design studies were for differences in change scores on the dependent measures, whereas the comparisons in the pretest-posttest design studies were for changes on dependent measure between test occasions.

Four studies were conducted in Canada and 21 studies were conducted in the United States. Ten studies were published in peer-reviewed journals (Baker, Rude, Sasso, & Weishahn, 1994; Binkard, 1985; Dunst, 2012; Gilfoyle & Gliner, 1985; Rosenbaum et al., 1986b; Snart & Maguire, 1986, 1987), whereas the other studies were reported either in dissertation or master theses (Baker, 1991; Illmann, 1990; Johnson, 1998; Powell, 1985; Russell, 1993; Schumacher, 1998; Thorton-Biddle, 1983; Zucker, 1988) or were conference presentations or unpublished articles (Anderson, Del-Val, Griffin, & McDonald, 1983; Chase, Lebewohl, Mulcahy, & Shiffer, 1983; PACER Center, 1986; Pendzick, 1983).

The studies included 5,302 intervention group participants and 2,642 nonintervention group participants. The students were in Grades 1 through 7 at the time the studies were conducted, though the majority of the students were in Grades 2 through 6 (92%). The participants were

evenly divided between male (49%) and female (51%) students.

Nineteen studies were investigations of the *Kids on the Block* puppet shows and six studies were investigations of the *Count Me In* puppet shows. The majority of studies evaluated the effects of only puppet shows ( $n = 20$ ) on changes in students' attitudes or knowledge, whereas six studies evaluated the combined effects of the puppet shows plus some additional intervention (curriculum awareness units, speaker's bureau, weekly disability themes, or a buddy program). The puppet shows were performed by volunteers, professionals, or both volunteers and professionals, and lasted, on average, 45 min followed by a 10- to 15-min question-and-answer period.

All 26 studies included an attitude measure, and nine studies included a knowledge measure. The attitude measures included both published (e.g., Bagley & Green, 1981; Lazar, 1973; Rosenbaum, Armstrong, & King, 1986a; Voeltz, 1980) and investigator-developed or adapted scales. The knowledge measures also included published (e.g., Hazzard, 1983; Stainback & Stainback, 1985) and investigator-developed or adapted scales. Both types of measures were either self-report scales or were orally administered to the students. Pretest measures of the students' attitudes or knowledge were administered from 1 to 7 days before the puppet shows and the posttests were administered either on the same day as the puppet shows or between 1 and 42 days after the puppet shows were completed. Eleven studies included the attitude or knowledge measures at specific grade levels whereas 15 studies included the measures for different grade level combinations.

#### METHOD OF ANALYSIS

Cohen's  $d$  effect sizes were used to estimate the sizes of effect of the puppet shows on changes in students' attitudes and knowledge. Procedures described by Morris and DeShon (2002) were used to calculate effect sizes for changes in the students' attitude and knowledge scores in order to yield comparable estimates of the population parameters regardless of research design. This was accomplished by computing the difference between the pretest-posttest means for the intervention and nonintervention groups (numerator)

and then by estimating the effect sizes for the change scores using research design-specific dominant terms to obtain common sizes of effect. As described by Morris and DeShon, bias associated with the different computational methods is reduced when the time between the pretests and posttests are identical for participants in the same study, which was the case in all the studies in the meta-analysis. The means and standard deviations for the intervention and nonintervention groups were included in 16 research reports to calculate effect sizes, whereas effect sizes were estimated in 10 studies from chi-square analyses.

The pooled weighted average effect sizes and their 95% confidence intervals (CI) were computed for the various comparisons and contrasts reported below to ascertain the nature of the relationships between the puppet shows and changes in the students' attitudes and knowledge. The  $Z$  statistic was used to test the null hypothesis that no relationship existed between the puppet shows and the study outcomes (Shadish & Haddock, 2009).  $Q_{BET}$  was used to test for the differences in the sizes of effect for different comparisons and contrasts (outcome measures, grades, timing of the posttest measures, etc.).  $Q_{BET}$  is "analogous to the omnibus  $F$ -test for variation in group means in a one-way ANOVA" (Hedges, 1994, p. 290). Cohen's (1988) benchmarks for ascertaining the magnitude of the average effect sizes and CIs as small (.20-.49), medium (.50-.79), or large (.80 or larger) were used for substantive interpretation of the results.

## RESULTS

### TYPES OF PUPPET SHOWS

The comparisons between the *Kids on the Block* and *Count Me In* puppet shows had to be limited to changes in students' attitudes because no studies of the *Count Me In* puppet shows included knowledge measures. The average effect sizes for changes in students' attitudes was  $d = .24$  [95% CI = .19, .29],  $Z = 10.06$ ,  $p = .0000$ , for the *Kids on the Block* puppet shows, and  $d = .38$  [95% CI = .32, .44],  $Z = 12.68$ ,  $p = .0000$ , for the *Count Me In* puppet shows. The effect sizes for changes in students' attitudes were small as evidenced by

the ranges in the CIs. The magnitude of the difference between the two average effect sizes was statistically significant,  $Q_{BET} = 13.54$ ,  $df = 1$ ,  $p = .0023$ , favoring the *Count Me In* puppet shows.

Inasmuch as the *Count Me In* puppet show studies all employed one-group pretest-posttest designs, the between type of puppet show comparison was repeated including only studies using the same design for the *Kids on the Block* puppet shows. The average effects for changes in students' attitudes was  $d = .33$  [95% CI = .20, .46],  $Z = 4.98$ ,  $p = .0000$ , for the *Kids on the Block* puppet shows, and  $d = .38$  [95% CI = .32, .44],  $Z = 12.68$ ,  $p = .0000$ , for the *Count Me In* puppet shows. There was no between type of puppet show difference,  $Q_{BET} = .62$ ,  $df = 1$ ,  $p = .4329$ , indicating that both puppet shows were equally effective in changing students' attitudes.

### BETWEEN OUTCOME MEASURE COMPARISONS

The average effect size for the puppet shows was  $d = .30$  [95% CI = .26, .33],  $Z = 15.76$ ,  $p = .0000$ , for the attitude measures, and  $d = .53$  [95% CI = .48, .59],  $Z = 17.55$ ,  $p = .0000$ , for the knowledge measures. The results showed that the puppet shows had a small effect on changes in the students' attitudes and a small to medium effect on changes in the students' knowledge of individuals with disabilities as evidenced by the ranges in the CIs for the two outcome measures. A between type of outcome measure comparison indicated that the two average effect sizes differed significantly,  $Q_{BET} = 44.06$ ,  $df = 1$ ,  $p = .0000$ , indicating that the influences of the puppet shows were more pronounced for changes in students' knowledge compared to changes in students' attitudes.

To be assured that the between outcome measure comparison results were not confounded by the fact that some studies did not include both attitude and knowledge measures, the analyses were repeated for studies that only included both outcome measures. The average effect size for the puppet shows was  $d = .20$  [95% CI = .14, .26],  $Z = 6.12$ ,  $p = .0000$ , for changes in the attitude measures, and  $d = .53$  [95% CI = .48, .59],  $Z = 17.55$ ,  $p = .0000$ , for changes in the knowledge measures. The between outcome measure comparison was statistically significant,  $Q_{BET} = 61.75$ ,

**TABLE 1**

*Average Effect Sizes and 95% Confidence Intervals for the Influences of the Puppet Shows on Students' Attitudes and Knowledge by Grade Level*

<i>Outcome Measures</i>	<i>Number of Effect Sizes</i>	<i>Average Effect Size</i>	<i>95% CI</i>	<i>Z-test</i>	<i>p-value</i>
<i>Students' Attitudes</i>					
Grades 1-2	5	.49	[.34, .64]	6.49	.0000
Grades 3-4	18	.30	[.24, .36]	9.51	.0000
Grades 5-6	20	.28	[.23, .32]	11.09	.0000
<i>Students' Knowledge</i>					
Grades 1-2	2	.48	[.25, .71]	4.13	.0000
Grades 3-4	11	.57	[.50, .64]	15.75	.0000
Grades 5-6	4	.44	[.31, .57]	6.78	.0000

*Note.* CI = Confidence interval.

$df = 1, p = .0000$ , where the pattern of results was much the same as when all studies were included in the between outcome measure analyses.

*The results showed that the puppet shows had a small effect on changes in the students' attitudes and a small to medium effect on changes in the students' knowledge of individuals with disabilities as evidenced by the ranges in the confidence intervals for the two outcome measures.*

**TYPE OF INTERVENTION**

Whether puppet shows alone or puppet shows plus another intervention (curricular units, speaker's bureau, weekly themes, or buddy program) had similar effects on changes in the students' attitudes and knowledge was examined by two between types of intervention comparisons, one for the attitude measures and one for the knowledge measures. The average effect sizes for the attitude measures were  $d = .35$  [95% CI = .31, .39],  $Z = 17.20, p = .0000$ , for puppet shows alone, and  $d = -.03$  [95% CI = -.12, .07],  $Z = 0.52, p = .6059$ , for puppet shows plus another intervention. The difference in the average effect sizes for the two types of interventions was statistically significant,  $Q_{BET} = 47.68, df = 1, p = .0000$ , favoring puppet shows alone. However, inspection of the individual effect sizes for the pup-

pet shows plus another intervention indicated that the lack of an effect for changes in the students' attitudes was due to medium to large negative effects in two studies which suppressed the influence of the combined interventions in the other studies. Therefore, the lack of effect of puppet shows plus another intervention may have been confounded by the findings in those two studies.

The average effect sizes for the knowledge measures were  $d = .55$  [95% CI = .48, .62],  $Z = 16.18, p = .0000$ , for puppet shows alone, and  $d = .46$  [95% CI = .33, .59],  $Z = 6.91, p = .0000$ , for the puppet shows plus another intervention. The difference in the effect sizes for the two groups was not statistically significant,  $Q_{BET} = 1.62, df = 1, p = .2038$ , indicating no added advantage to adding another intervention to the puppet shows.

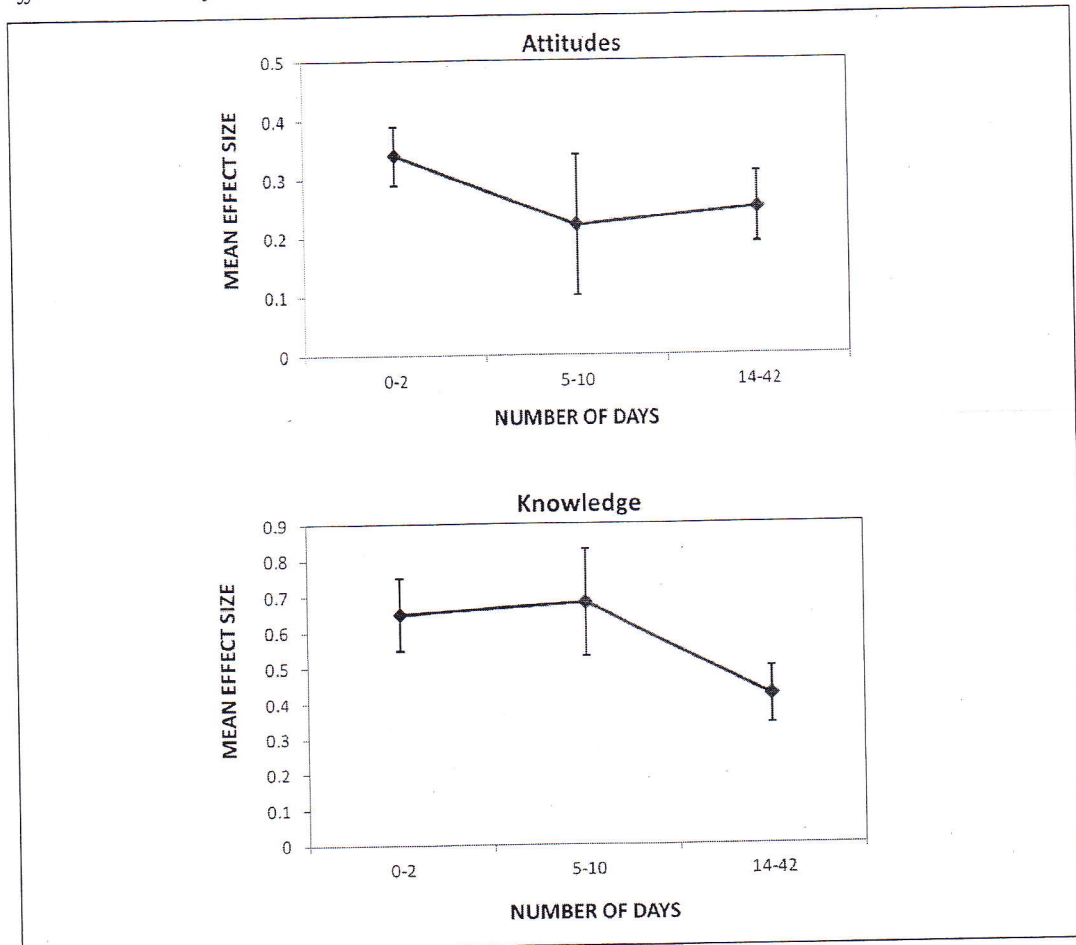
**GRADE LEVEL DIFFERENCES**

The influence of the puppet shows on changes in students' attitudes and knowledge at different grades is shown in Table 1. The average effect sizes at all grade levels differed significantly from zero as evidenced by statistically significant  $Z$ -tests for both the attitude and knowledge measures. The sizes of effects were predominately small for changes in students' attitudes, as evidenced by the ranges in the CIs, and small to medium for changes in the students' knowledge, also evidenced by the ranges in the CIs.

Two between grade level comparisons, one for the attitude measures and one for the knowl-

**FIGURE 1**

*Effect Sizes and Confidence Intervals for When Posttests Were Administered*



*Note.* Figure reflects average effect sizes and 95% confidence intervals (error bars) for the relationship between when the posttests were administered and changes in the students' attitudes and knowledge outcomes.

edge measures, yielded a between grade level difference in the sizes of effect for changes in the students' attitudes,  $Q_{BET} = 7.23$ ,  $df = 2$ ,  $p = .0269$ , but not their knowledge,  $Q_{BET} = 3.14$ ,  $df = 2$ ,  $p = .2079$ . As can be seen in Table 1, the influences of the puppet shows on changes in students' attitudes was more pronounced for Grades 1 and 2 compared to Grades 3 through 6.

#### *TIMING OF THE POSTTEST MEASURES*

The extent to which timing of the posttest measures was related to differences in the students' attitudes or knowledge was determined by computing the average effect sizes of the puppet shows for the posttest measures obtained 0 to 2

days, 5 to 10 days, or 14 to 42 days after the puppet shows were conducted. The findings are shown in Figure 1. All of the average effect sizes for both outcome measures differed significantly from zero,  $Z_s = 3.44$  to  $9.30$ ,  $p_s = .0006$  to  $.0000$ , indicating that the puppet shows had positive influences on changes in the students' attitudes and knowledge regardless of when the posttests were administered. However, the between group comparisons were statistically significant for both the attitude,  $Q_{BET} = 6.19$ ,  $df = 2$ ,  $p = .0452$ , and the knowledge,  $Q_{BET} = 15.47$ ,  $df = 2$ ,  $p = .0004$ , measures. Findings indicated that changes in the students' attitudes and knowledge were more pronounced when the posttests were administered

**TABLE 2**

*Study-Related Moderators of the Effects of the Puppet Shows on the Student Outcomes*

<i>Moderators</i>	<i>Outcome</i>	<i>Number of Effect Sizes</i>	<i>Average Effect Size</i>	<i>95% CI</i>	<i>Z-test</i>	<i>p-value</i>
<i>Type of Design</i>						
Independent-Groups	Attitudes	33	.23	[.18, .28]	8.85	.0000
	Knowledge	10	.37	[.32, .43]	13.60	.0000
One-Group Pre-Post	Attitudes	16	.49	[.43, .55]	15.59	.0000
	Knowledge	1	1.43	—	—	—
<i>Year of Publication</i>						
1983–1990	Attitudes	22	.35	[.30, .40]	14.40	.0000
	Knowledge	5	.83	[.71, .96]	13.31	.0000
1991–Present	Attitudes	21	.22	[.16, .28]	7.27	.0000
	Knowledge	12	.44	[.37, .51]	12.67	.0000
<i>Peer Reviewed</i>						
Yes	Attitudes	18	.38	[.33, .43]	15.16	.0000
	Knowledge	8	.64	[.53, .76]	11.16	.0000
No	Attitudes	25	.19	[.13, .24]	6.78	.0000
	Knowledge	9	.49	[.42, .56]	13.73	.0000
<i>Type of Outcome Measure</i>						
Self-Report	Attitudes	23	.38	[.33, .43]	15.73	.0000
	Knowledge	6	.45	[.31, .58]	6.50	.0000
Orally-Administered	Attitudes	20	.17	[.11, .23]	5.54	.0000
	Knowledge	11	.56	[.49, .62]	16.36	.0000
<i>Type of Outcome Scale</i>						
Dichotomous	Attitudes	11	.32	[.22, .41]	6.58	.0000
	Knowledge	9	.55	[.45, .65]	10.71	.0000
Multi-Item	Attitudes	32	.29	[.25, .33]	14.32	.0000
	Knowledge	8	.53	[.45, .60]	13.90	.0000
<i>Adapted Outcome Measure<sup>a</sup></i>						
Yes	Attitudes	9	.37	[.32, .43]	13.25	.0000
	Knowledge	3	.91	[.76, 1.06]	11.68	.0000
No	Attitudes	34	.24	[.19, .29]	9.26	.0000
	Knowledge	14	.47	[.40, .53]	14.10	.0000

Note. CI = Confidence Interval.

<sup>a</sup>Includes investigator-developed measures.

shortly after the puppet shows were completed, and waned somewhat when the posttests were administered 2 to 6 weeks after the puppet shows were attended by the students.

*MODERATOR ANALYSES*

In addition to the influence of type of intervention, grade, and timing of the posttest measures on the effects of the puppet shows on changes in the students' attitudes and knowledge, the moderating effects of six study-related variables were also examined. The moderators included type of research design (independent groups vs. one-

group pretest-posttest), year of study publication, whether or not the research reports were peer-reviewed, whether the outcome measures were self-report scales or orally administered, whether the students' responses on the outcome measures were dichotomies (yes/no, true/false) or multi-item responses (e.g., Likert scales), and whether the outcome measures were validated in previous studies or were adapted versions of those scales or investigator-developed measures. The results are shown in Table 2. All of the average effect sizes differed statistically from zero regardless of the moderators for both the attitude and knowledge measures. The majority of the effect sizes for the attitude

measures were small, and the majority of the effect sizes for the knowledge measures were small to medium, as evidenced by the ranges of the CIs for both outcome measures. The patterns of results were much the same as those described previously for the main effect analyses.

A series of between moderator group comparisons for the attitude effect sizes found significant differences for type of research design,  $Q_{BET} = 14.88$ ,  $df = 1$ ,  $p = .0001$ ; year of publication,  $Q_{BET} = 11.78$ ,  $df = 1$ ,  $p = .0006$ ; whether or not the research reports were peer-reviewed,  $Q_{BET} = 26.00$ ,  $df = 1$ ,  $p = .0000$ ; type of outcome measure,  $Q_{BET} = 29.91$ ,  $df = 1$ ,  $p = .0000$ ; and whether the outcome measures were either adapted versions or investigator-developed scales,  $Q_{BET} = 12.90$ ,  $df = 1$ ,  $p = .0003$ . One-group pretest-posttest studies had larger effect sizes compared to independent-group studies; studies conducted between 1983 and 1990 had larger effect sizes compared to studies conducted between 1991 and 2012; peer-reviewed studies had larger effect sizes compared to non-peer-reviewed studies; studies using self-report scales had larger effect sizes compared to studies employing orally administered scales; and investigator-adapted or developed outcome measures had larger effect sizes compared to studies using previously validated scales.

The same between moderator group analyses for the knowledge measures produced significant between effect size differences for year of publication,  $Q_{BET} = 29.71$ ,  $df = 1$ ,  $p = .0000$ , whether or not the research reports were peer-reviewed,  $Q_{BET} = 4.88$ ,  $df = 1$ ,  $p = .0272$ , and whether investigator-adapted or developed scales were used as outcome measures,  $Q_{BET} = 27.24$ ,  $df = 1$ ,  $p = .0000$ . Results showed that studies conducted between 1983 and 1990 had larger effect sizes compared to studies conducted more recently, peer-reviewed studies had larger effect sizes compared to non-peer-reviewed studies, and investigator-adapted or developed outcome measures had larger effect sizes compared to studies using previously validated scales.

#### THREATS TO INTERNAL VALIDITY

The extent to which factors other than the puppet shows accounted for observed changes was de-

termined by computing the effect sizes for the differences between the pretest-posttest scores separately for the intervention and nonintervention group participants. The results are shown in Figure 2. The pretest-posttest effect sizes for the attitude,  $d = .34$  [95% CI = .30, .38],  $Z = 15.67$ ,  $p = .0000$ , and knowledge,  $d = .61$  [95% CI = .54, .69],  $Z = 16.40$ ,  $p = .0000$ , measures were statistically significant for the intervention group participants. In contrast, the effect sizes for the attitude,  $d = .04$  [95% CI = -.04, .11],  $Z = 1.03$ ,  $p = .3041$ , and knowledge,  $d = .08$  [95% CI = -.16, .01],  $Z = 1.87$ ,  $p = .0620$ , measures were not statistically significant for the nonintervention group participants.

Neither history nor maturation would likely have influenced the study outcomes because the time between the pretests and posttests were 2 weeks or less in the largest number of studies (75%) where events other than the puppet shows would unlikely be factors accounting for observed changes. Testing can also be ruled out because both the intervention and nonintervention group participants were administered the dependent measures on a pretest-posttest basis. Similarly, subject attrition would not seem to be an explanatory factor because nearly all the children in both the intervention and nonintervention groups completed the attitude and knowledge sections at both the pretests and posttests.

Two potential threats to internal validity, at least in certain studies, are selection and instrumentation. Selection could be a confounding factor because so little information was provided about the study participants, and it may be that differences in the characteristics of the children in the intervention and nonintervention groups influenced students' scores on the dependent measure. Instrumentation is perhaps the one factor that stands out as a possible confound because a number of scale-related factors moderated the effects of the puppet shows (see Table 2).

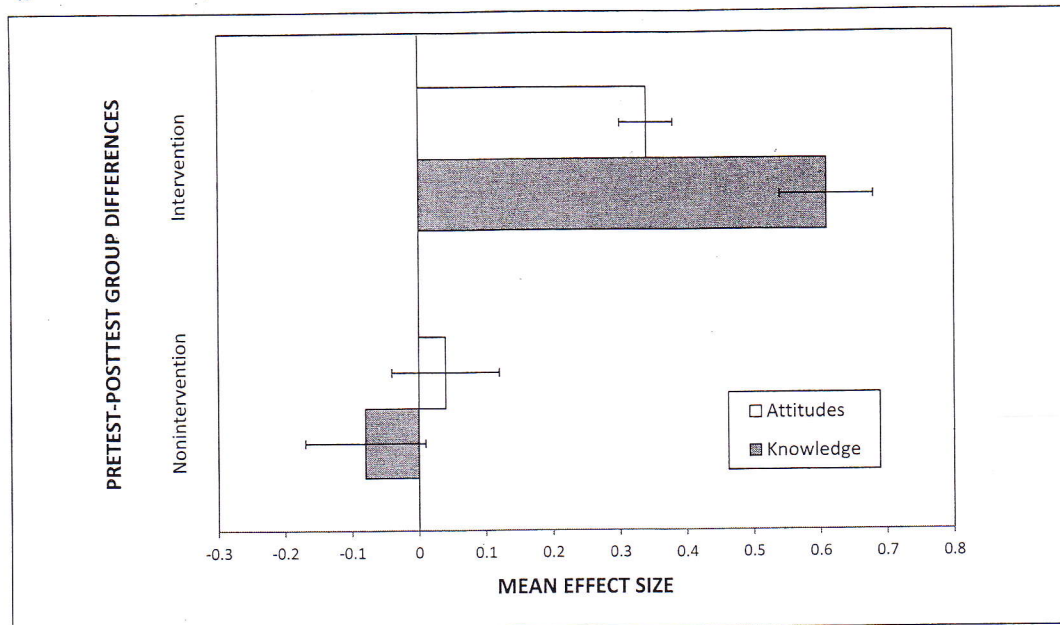
#### DISCUSSION

Findings from the meta-analyses of studies of the *Kids on the Block* and *Count Me In* puppet shows indicated that the interventions had small effects on changes in students' attitudes toward, and



**FIGURE 2**

*Effect Sizes and Confidence Intervals for the Two Groups of Participants*



*Note.* Average effect sizes and 95% confidence intervals (error bars) for the pretest-posttest differences for the intervention and nonintervention group participants.

small to medium effects on changes in students' knowledge of, individuals with disabilities. The fact that the sizes of effect of the puppet shows were small to medium was not unexpected given the fact that the interventions lasted only 45 min to 60 min and were implemented with a relatively large number of students primarily on a single occasion. However, the different analyses helped identify the conditions under which the puppet shows influenced student outcomes. Results showed that the puppet shows were more effective in changing the attitudes of younger compared to older students (Table 1) and that the effects of the puppet shows were somewhat diminished over time (Figure 1).

The fact that the effects of the puppet shows were larger for changes in knowledge compared to changes in attitudes deserves comment in light of research showing that accurate knowledge of individuals with disabilities is correlated with positive attitudes towards persons with disabilities (e.g., Hannon, 2007; Magiati, Dockrell, & Logotheti, 2002; Yazbeck, McVilly, & Parmenter, 2004). A *post hoc* weighted correlation analysis of the relationship between the knowledge and attitude ef-

fect sizes was statistically significant,  $r = .45$ ,  $p = .0000$ , indicating that greater changes in students' knowledge were related to greater changes in students' attitudes.

The different types of analyses, and the various comparisons and contrasts that were conducted, permitted tests of alternative explanations for observed changes in the students' attitudes and knowledge. The largest majority of threats to internal validity as well as other explanatory factors could be reasonably ruled out as confounds with only a few exceptions (instrumentation and selection). When these threats were eliminated as factors accounting for observed changes by analyzing only studies where those threats were controlled, the sizes of effects for changes in attitudes were still small, and sizes of effects for changes in knowledge remained small to medium.

Findings from the moderator analyses of the nonintervention variables (Table 2) indicated that five of the six study-related variables were associated with variations in the sizes of effect for either or both students' attitudes and knowledge. As is often the case, peer-reviewed studies were associated with larger effect sizes compared to non-

peer-reviewed studies (see Begg, 1994). More recently completed studies, which tended to be better designed and implemented investigations, were associated with smaller effect sizes. The results also showed that the effect sizes for students' attitudes were larger when measured by self-report compared to orally-administered outcome scales and that the use of previously validated measures was associated with smaller effect sizes compared to investigator-developed or adapted scales.

The results from the meta-analysis, taken together, indicate that puppet shows were an effective intervention for changing attitudes toward and knowledge of individuals with disabilities among elementary students. The strengths of the meta-analysis include the fact that 26 studies of more than 5,300 intervention group participants were included in the systematic review, and that regardless of the moderator variables or other explanatory factors, the findings showed that the puppet shows were associated with positive results. There were, nonetheless, a number of weaknesses in the original studies, and thus the meta-analysis, that became increasingly apparent as study coding proceeded and data analysis was conducted. These shortcomings included (a) little or no information about adherence (fidelity) to the puppet show scripts, (b) a lack of a complete description of the students and their prior experiences with peers or other individuals with disabilities, (c) limited or no information about the schools or districts where the puppet shows were performed, and (d) a lack of description of the backgrounds of and manner in which the puppeteers performed the shows. Another shortcoming was that many investigators used adapted versions of attitude or knowledge measures or investigator-developed scales but without any information about the psychometric properties of the adapted or newly developed measures. It was therefore not possible to evaluate any of those study-related factors on the effectiveness of the puppet shows, which needs to be a focus of analysis in future studies of puppet shows.

#### *IMPLICATIONS FOR PRACTICE*

Findings from the meta-analysis indicate that puppet shows appear to be warranted as an inter-

vention for changing elementary students' knowledge of and attitudes toward individuals with disabilities, at least in terms of initial exposure to information about individuals with disabilities before misconceptions and misunderstandings are internalized. Puppet shows, however, would not be expected to have long-term stable effects if not supplemented by other experiences (see Figure 1). Findings from literature reviews of interventions for promoting changes in children's knowledge and attitudes suggest that engagement in mutually interesting or cooperative activities such as sports, entertainment, and field trips provide opportunities for students without disabilities to interact with and learn about students with disabilities in ways that contribute to positive knowledge and attitude changes (Garcia et al., 2009; Hannon, 2007). Puppet shows therefore should be considered an introductory experience that sets the stage for other kinds of experiences and opportunities for students with and without disabilities to interact with one another.

*Thus, puppet shows plus real-life, situated interactional opportunities are indicated as a way to affect changes in children's knowledge of and attitudes toward peers with disabilities beyond those associated with puppet shows.*

Based on available research and practice, the kinds of interactive experiences that are most likely to strengthen the effects of puppet shows are ones that are mutually interesting, enjoyable, and beneficial to children with and without disabilities (e.g., Dunst, Hamby, & Snyder, 2009; Eriksson, Welander, & Granlund, 2007; Fennick & Royle, 2003; Orlin et al., 2010; Solish, Perry, & Minnes, 2010). Dunst (2001), for example, found that engaging young children with disabilities in typically occurring community activities (e.g., tee ball, scouts, dance, music) with children without disabilities had positive effects on the children, their parents, and other adults involved in the activities (see also Fink, 2000). Thus, puppet shows plus real-life, situated interactional opportunities are indicated as a way to affect changes in children's knowledge of and attitudes

toward peers with disabilities beyond those associated with puppet shows. Parenthetically, the experiences would not include the types of supplemental interventions used in the studies in the meta-analysis described in this article, which used puppet shows plus another contrived intervention to affect changes in students' attitudes and knowledge. This is the case because the supplemental interventions did not explicitly involve children with and without disabilities engaged in mutually interesting and enjoyable activities but rather were predominately experiences where the students were passive recipients of information about disabilities. This might explain why adding a second intervention to the puppet shows proved not to have value added effects.

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