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Social/Communicative Interventions and Transition Outcomes

for Youth with Disabilities: A Systematic Review

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Abstract

The relationship between social and communicative interventions and transition-related outcomes for secondary aged youth with disabilities was explored in this systematic review. A total of 30 studies intervening with 316 youth with a broad range of disability labels (both high and low incidence disabilities) were reviewed. Subgroup analyses were conducted on original research in these areas: augmentative and alternative communication (AAC), conversation skills, decreasing inappropriate behavior, and social skills training (SST). Little support was found for AAC interventions; modest support was found for interventions designed to increase conversation skill acquisition and for SST interventions; and interventions designed to decrease inappropriate social behavior displayed narrative support from the authors, but were not subjected to meta-analytic statistical techniques due to effect size calculation formula problems with this class of studies. Results were discussed in terms of alignment of our substantive findings with prior meta-analytic work, and in terms of methodological issues in meta-analysis.

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Introduction

Social and communicative skills represent critical *student development* skills in a

transition-focused education (Kohler & Field, 2003). Social competence is arguably central to

navigating each of Halpern's (1994) educational outcome areas: vocational pursuits,

postsecondary education, relationships with others, community participation and maintaining a

home. Youth who lack social competence are ostensibly at risk for numerous difficulties,

including rejection by peers, academic failure, social isolation and dissatisfaction, aggression,

difficulty maintaining employment and developing relationships with others, mental health

issues, and contact with the legal system (Maag, 2005, p. 155). Yet a lack of communicative and

social competence is a defining characteristic of, at least in part, many disabilities such as autism

and other disorders on the autism spectrum, mental retardation, learning disabilities, and

emotional/behavioral disorders (cf. Cartledge, 2005; Gresham, Sugai, & Horner, 2001; Janney &

Snell, 2000; Maag, 2005; Wetherby & Prizant, 2000).

Consequently, much has been written about the association between, and the importance

of, social and communicative competence for children and youth with disabilities; likewise,

communicative and social skills interventions have been the focus of a wide variety of

intervention research efforts. Some clarification of terms is warranted here.

Social Competence/Social Skills

Janney and Snell (2006) define *social competence* as both an individual's effectiveness at

influencing the behavior of those around them, and, given a variety of settings, contexts, and

cultures, the appropriateness of the behavior(s) (p. 13). The latter depicts the ability to adjust

one's behavior in various contexts to fit in, including use of language. Teachers of foreign

language commonly refer to this as "code switching" (Numan & Carter, 2001). Generally

referring to alternation between languages, code switching might be broadened to include such

adjustments as use of formal language versus slang in different contexts. While social

competence is the broad category of behaviors, it subsumes numerous specific sub skills, such as

social interaction skills, reciprocity, communicative competence, and communication skills.

Janney and Snell (2000) define *social interaction skills* as:

… an array of interpersonal behaviors such as greeting others, commenting/acting on

others' requests or remarks, initiating an exchange, asking others to respond to or engage

in an activity, entering into an ongoing social dyad or group, taking turns, taking actions

intended to maintain an exchange or social activity, and terminating an interaction (p. 3).

Social reciprocity, conversely, has been defined as an interdependent exchange of interactions

between two individuals that reflects balanced turn-taking (2000, p. 3). In the special education

literature, related terms include peer relationships, friendship, social networks, development of

friendships, and peer supports.

The literature on social skills training (SST) with students with high incidence disabilities

differentiates between social skills and social competence in this way: social skills are behaviors

that must be taught, learned and performed whereas social competence is broader and includes

judgments or evaluations of social behaviors within and across situations (Gresham et al. 2001,

p. 333). In other words, social skills are the specific behaviors targeted in SST, and social

competence is the umbrella concept referring to the adequacy of a person's general social

functioning (Maag, 2005, p. 156). Social competence is inferred, for example, when the social

skills targeted for instruction result in acquisition and lead directly to increased acceptance by

peers, and more positive judgments by important others, such as teachers and parents. Whether or not a social skill targeted for intervention leads to improved life quality is a question of social validity (p. 157).

Communicative Competence/Communication Skills

While social competence may include non-communicative behaviors (for example, dressing appropriately for work and arriving on time) – communication skills are specifically relational. By definition, communication requires at least two people (or other sentient beings), a sender of a message and a receiver. The need for communication partners constitutes the essential social aspect of communication (Downing, 2005). Other critical components of communication include *form* or *means* (a way to send a message), *content* (something to talk about) and a reason or *purpose* (communicative *function*) to communicate (p. 4). Communicative means include the primitive, such as screaming, crying, vocalizations, changes in muscle tone, gestures, and facial expressions, to the sophisticated, for example, fluent speech, sign language, and use of complex voice output devices with multiple levels and potentially unlimited messages. Communication topics are self-evident; reasons to communicate include the expression of wants and needs, information transfer, social etiquette and social intimacy (p. 4).

Communication is fundamental to most activities in our lives. The ability to make requests, choices, protests, and comments is integral to early development of self concept, intelligence and self esteem; and remains central throughout life, as we develop interpersonal relationships, and eventually, social networks; and navigate school, work, and the larger community.   Much of what we learn is also predicated on making sense of our interactions with others.

Augmentative and Alternative Communication (AAC)

A compilation of methods and technology designed to supplement (or replace) spoken communication for persons with limited speech and/or language skills, AAC is prevalent in educational programs for children and youth with developmental and intellectual disabilities (Wilkinson & Hennig, 2007). According to Beukelman and Mirenda (2005, p. 4), AAC is a system with four primary components: symbols (including graphic, auditory, gestural, and textural or tactile symbols), aids (any device used to transmit or receive messages), techniques (ways that messages can be transmitted), and strategies (ways in which messages can be conveyed most effectively and efficiently). The development of social and communicative competence can be particularly complex for AAC users, requiring that competent communicators have knowledge, judgment, and skills in both sophisticated socio-linguistic and socio-relational aspects of communication (knowledge of when to speak, when not to, and what to talk about, with whom, when, where, and how). Initiating, maintaining, and terminating conversations, giving and taking turns, communicating varied functions (e.g., requesting, rejecting, commenting), and engaging in different kinds of interactions are all considered sociolinguistic skills. In comparison, socio-relational skills include: an interest in others and a desire to communicate, a positive self concept, active participation in conversational exchanges, responsiveness to partners, and the ability to put partners at ease (Beukelman & Mirenda, p. 12).

Brief Review of Related Literature

In this section, systematic and meta-analytic reviews already completed in the intervention literature on SST and/or AAC skills development for youth with both high and low incidence disabilities are highlighted.

For students with high incidence disabilities (LD, E/BD, mental retardation, and ADHD), the number of intervention studies on social skills training (SST) reached a critical mass in the past quarter century, prompting multiple narrative and meta-analytic reviews, including those completed by Forness and Kavale, (1996); Forness, Kavale, Blum and Lloyd (1997); Quinn, Kavale, Mathur, Rutherford, and Forness (1997); Mathur, Kavale, Quinn, Forness, and Rutherford (1998); and Kavale and Mostert (2004). In the first of these, Forness and Kavale (1996) conducted a meta-analysis of the social skills training research for learners with LD. They found very modest positive effects overall across more than 50 intervention studies and concluded that social skills deficits are very resistant to treatment. These findings were discussed in relation to relatively brief treatment periods (average intensity was fewer than 3 hours per week for less than 10 weeks), measurement issues, treatment packages, research design issues, and issues regarding the efficacy of the treatments themselves. For example, the authors speculated that perhaps SST programs for students with LD lack the "cognitive and linguistic emphases needed for this population" (p. 12).

Mathur et al. (1998) conducted a systematic review of social skills interventions with children and youth with E/BD. Reviewing a body of literature comprised of 64 studies with single participant designs, these authors also found a relative lack of empirical evidence to support the overall effectiveness of the interventions. In their discussion, they speculated that inappropriate social behaviors may be more difficult to reduce than it is to acquire appropriate conversation or social skills (p. 198). In a similar vein, Quinn et al. (1997) conducted a meta-analysis of studies with group designs and social skills interventions for children and youth with E/BD; again, results showed modest treatment effects. These systematic reviews and meta-analyses were consistent in findings with an earlier meta-analysis conducted by Kavale and

Forness (1995) of social skills interventions with students with LD.   Finally, Forness et al. (1997) conducted a "mega-analysis" of meta-analyses in a number of related areas in special education and related services, one of which was social skills training. They reported an overall effect size of .21, indicating a positive, small, social skills training treatment effect.

Gresham et al. (2001) wrote an interpretive analysis of the mixed outcomes in the SST literature among both narrative and meta-analytic reviews, recasting discrepant results in light of population characteristics, matching treatments to type of social skills deficits, and issues of treatment integrity, assessment, and generalization (p. 337).   Their efforts led to new conclusions, such as the observation that SST studies that matched social skills deficits with interventions were more likely to produce positive results; the most effective SST procedures appeared to be some combination of modeling, coaching, and reinforcement procedures, and the duration and intensity of SST intervention activity appears to have a positive relationship with results. They made numerous recommendations for researchers and practitioners.

In a more recent interpretive work, Maag (2005) also discussed multiple systematic reviews of SST for youth with E/BD and LD, and based on these reviews, highlighted three salient features among the SST intervention literature: 1) behaviors that are not necessarily socially valid are often targeted for training; 2) training techniques are only rarely matched to the reasons youth fail to perform the skills; and 3) a large investment in SST has resulted in relatively small changes over time in social acceptance for youth with E/BD and LD (p. 156). Cartledge (2005) made a similar observation concluding that for youth with mild disabilities, packaged programs have often been taught sequentially regardless of individual student deficits and needs. These interpretive works are replete with evidence-based suggestions for refining SST to increase positive outcomes for youth with higher incidence disabilities, given a general

consensus that social skills are critical both to school success and overall adult competence despite the challenges of teaching them.

For adolescents with more severe disabilities, social skills instruction has historically been more individualized, based on functional assessments of individual skill repertoires (such as discrepancy analyses of skills needed in particular environments of importance to the child). Reviews of social/communicative skills have been conducted in disability-specific areas – for example, with children and youth who are AAC users, and children and youth with autism.

In one such review, Lancioni, O' Reilly, and Basili (2001) compiled the literature on the use of micro-switches (tools of access where person can activate toys, sound and light displays, or other sources of stimulation, and interact with his or her environment) and speech output systems with persons with intellectual or multiple disabilities. Their sample included the years 1986-1999, and they found modestly but consistently positive overall effects for the use of micro-switches with few exceptions – those exceptions were discussed in terms of relative ability of the participants. For speech output systems, they reported a "fairly positive" and "reassuring view" about this form of technology (p. 30). Results were discussed in terms of the benefits of speech output systems for users.

While no reviews specific to teaching conversation skills to children or youth with disabilities came to light in our searches, there was a recent noteworthy exception. Pennington, Goldbart, and Marshall (2004) searched the literature for empirical evidence on the efficacy of interaction training for conversational *partners* of children with cerebral palsy (also containing measures of the impact on the children with CP), and found 4 studies meeting their inclusionary criteria. Unfortunately, the 4 studies reportedly contained methodological flaws, so the reviewers felt that their results were inconclusive.

Most experts agree that autism and disabilities on the autism spectrum (e.g., Wetherby & Prizant, 2000) represent a special case with their own profile and somewhat unique learning challenges. Neuro-developmental in origin, these disabilities most affect communication and social skills development, as well as stereotyped patterns of behavior and interest. Mirenda (2001) conducted a narrative review of the empirical literature regarding communication and learning in children and youth with autism or pervasive developmental disorder, not otherwise specified (PDD-NOS) and AAC and assistive technology (AT). She found empirical support for assessment, staff/family training, augmented input, augmented output, and AT for communication and learning. She also made several practical recommendations for both research and practice.

A recent development in instructional interventions for students with autism spectrum disorders and other developmental disabilities is the use of social stories to teach a variety of pro-social behaviors. Reynhout and Carter (2006) conducted a descriptive review and meta-analysis of selected single-case design studies using social stories, and reported highly variable results. They discussed these in terms of methodological problems with the studies, for instance, a lack of clear participant descriptions, and treatment confounds with other interventions in the studies. They concluded that social stories may be promising – but more higher-quality efficacy research is needed.

Reviews have also been conducted looking at social and communicative skills development at job sites (e.g., Storey, 1987, 2002), with results not dissimilar to related intervention studies with youth with disabilities. Storey (2002) reviewed evidence-based studies designed to increase social interactions for workers with disabilities in supported employment settings. He grouped his results into four areas with conclusions for practice in each: social skills

instruction (the evidence supports the efficacy of modeling, role-playing and feedback); problem-solving (giving a rationale, role-playing practice, feedback and reinforcement appear critical); communication skills (use of communication devices across settings, reciprocity, and facilitating opportunities for interaction); and co-worker support (co-workers appear able to provide a wide variety of supports to workers with disabilities with training and support). Finally, a host of recent reviews for high and low incidence disabilities have looked at social and communicative skills in terms of educational setting variables (e.g., Freeman, 2000; Hughes & Carter, 2000).

<div align="center">Summary</div>

This practice-based systematic review summarizes "scientifically-based" research studies that have been produced in the past two decades from three distinct perspectives: (a) interventions designed to build social and/or communicative skills, (b) transition or transition-related outcomes, and (c) samples of secondary-aged youth with disabilities. By *scientifically-based research studies* we mean reports of research studies that meet recently enacted federal research standards (Education Sciences Reform Act, 2002), stated in the Act as follows:

> The term "scientifically-based research standards" means research standards that – (i) apply rigorous, systematic, and objective methodology to obtain reliable and valid knowledge relevant to education activities and programs: and (ii) present findings and make claims that are appropriate to and supported by the methods that have been employed (p. 4).

These research studies were inclusive of reports of investigations employing group-based designs, single-participant designs, or qualitative designs, which also reported adequate evidence

of attention to the validity and reliability standards for the particular design used consistent with commonly accepted methodological tenets for well-implemented research.

By *social/communicative curricular focus* we mean original research studies that reported on the effects of implementing an intervention that had as its defining characteristic acquisition of a social/communicative skill in at least one of four areas: (a) AAC skills; (2) conversation skills; (c) decreasing inappropriate behaviors with competing pro-social communicative behaviors; and (d) social skills training (SST). By *transition or transition-related outcomes* we mean studies that measured outcomes associated with commonly-held conceptions of transition such as employment, participation in post-secondary education, maintaining a home, and/or experiencing satisfactory personal and social relationships (Halpern, 1994).

 Finally, by *samples of secondary-aged youth with disabilities* we mean studies whose samples were either youth with disabilities or were, in part, youth with disabilities and outcome measures for those youth with disabilities were reported separately. These youth must have been enrolled in secondary school environments or, if in non-graded residential or day treatment facilities, the studies must have reported the ages of those youth with disabilities as ages 13-22 inclusive.

The conceptual framework we used to guide our philosophical orientation to this systematic review is grounded in the ecological model of social functioning to help answer "what works" questions for social/communicative skills acquisition for youth with disabilities. An ecological framework provided the necessary conceptual structure to guide the scope, the methodology, and the development of this research synthesis. The question of "what works" can be translated by the classical ecological question posed by Wachs (1987): "Under what environments (situations, programs and settings) have what kinds of persons (the diverse

characteristics of all youth with disabilities) changed in what kinds of behaviors (social and communicative competence; adaptive behavior)?"

This ecological framework focuses on the transactional relationship among persons, environments and behaviors and was first introduced Karl Lewin (1936). Since Lewin's work, the application of the ecological framework has impacted much of the theoretical and implementation strategies associated with a wide range of human services and education. The ecological approach to understanding human behavior is well documented in the field of psychology (Bandura, 1979; Barker, 1968; Moos, 1976; Wicker, 1979).

The studies included in this review have been grouped into four categories based on characteristics of their interventions: AAC skills, conversation skills, decreasing inappropriate behavior explicitly through teaching functional communication responses, and SST. Each subsection is further defined in the remaining portions of this review.

This review adds to existing theory in the area of transition in two important ways. First, we have only included studies that combine the use of a transition-related treatment and measurement of one or more transition-related outcomes exclusively (or in large part) for secondary aged youth with identified disabilities, and the effects of the treatment must have been measured and reported in such a way that an effect size could be calculated (except, of course, with studies using qualitative designs). None of the reviews cited above constrained their reviews to this focus on measured effects *across research design types,* disability categories, and social and communicative skills with both broad and specific perspectives, for secondary youth with identified disabilities.

Second, we also required every study included in this review to meet minimum standards of internal and external validity (see Table 1 for an example of the standards and focusing

questions rubric we used to assess the studies that employ group designs, qualitative designs, and single participant designs). This rubric was adapted from early design work completed by meta-analysts and systematic review experts at both the Evidence for Policy and Practice Information and Co-ordinating Centre (EPPI-Centre) at the University of London, and at the What Works Clearinghouse (WWC) in the U. S. Department's Institute of Educational Sciences (see their respective websites at http://eppi.ioe.ac.uk/EPPIWeb/home.aspx and http://www.whatworks.ed.gov/). Hence, our review would be considered evidence-based and systematic (Cook, Mulrow, & Haynes, 1997). While some of the reviews mentioned earlier incorporated meta-analytic techniques, little or no attempts to screen studies with weak designs out of the review were reported.

Method

Search Strategy

To establish the most complete literature set possible, extensive systematic searches were conducted of relevant electronic databases, augmented by hand searches of selected journals, author searches, and searches of selected reference lists, especially of review articles. Two project staff members consulted with a literature search expert from the EPPI-Centre at the University of London to design and conduct the electronic searches. The databases that were searched included ERIC (Ovid and Cambridge), PsycINFO (Ovid), and Medline (Ovid). All possible disability, intervention, outcome, setting, and age terms were first identified using database thesauruses.

The search parameters and procedures described below were utilized to establish the databases for several reviews being conducted by the *What Works in Transition Systematic Review Project*, of which this review represents one of approximately 15 completed or in process

reviews. Therefore, some of the search terms included here may not be immediately pertinent to "social and/or communicative skills" Nonetheless, these were the search terms that produced the literature set for this map, so all terms that were used are delineated.

Thus, *disability terms included:* disabilities, emotionally disturbed, learning disabilities, mental retardation, attention deficit disorder, autism, Deaf, Deaf /Blind, physical disability, speech language disability, multiple disabilities, orthopedic impairment, and special education student(s). *Intervention terms included:* teaching, learning, special education, best practices, educational programs, community services, classroom discipline, school counseling, dropout prevention, job coaching, supported employment, community based instruction, behavior management, interagency collaboration, inclusive education, assistive technology, speech therapy, and vocational rehabilitation.

Outcome terms included: academic achievement, academic anxiety, education attainment level, achievement, diploma, school graduation, school expulsion, dropout, resiliency, school suspension, school retention, truancy, persistence, employment, employment status, GED, outcomes of education, treatment outcomes, outcomes of treatment, quality of life, recreation, relationships, school to work, transition, school -to -work transition, school transition, work, jobs, employment, and independent living. Finally, *setting terms included:* schools, residential care facility, accelerated programs, accelerated schools, alternative education, nontraditional education, alternative programs, alternative schools, colleges, community college, correctional institutions, high schools, middle schools, secondary education, higher education, junior high schools, mainstreaming, home school, technical school, vocational school, vocational education, and vocational high school.

Additional Sources

In addition to the electronic searches described above, a list of 10 representative journals was developed based on the recommendations of transition experts (a sample of the most prolific in special education transition, as well as a few representing low incidence disabilities) and a random sample (20% of 520 issues) of these journals were searched by hand by four staff members, beginning with 1990 publications and inclusive January 1, 2004. Our intent with this process was primarily to estimate the thoroughness of our electronic library search procedures. These searches yielded seven articles not already retrieved in the electronic search process; these were added to our database (and only one resulted in an article included in a review).

In the area of secondary transition, the outcome of all literature searching processes described resulted in 1,461 studies that appeared promising as intervention-based inquiries for which we acquired full-text reports/journal articles. These 1,461 studies then were screened for propriety for our meta-analysis interests – that is, they were intervention based, they had a measured outcome, the sample was youth with disabilities, and the age/grade level of those youth was between 12 and 22 years old. The reduction in the number of studies associated with this screening process was from the original 1,461 studies to 380.

These 380 studies were then subjected to a three-stage coding process. First a primary coder carefully extracted all the relevant information for this literature map from those studies, completing what we called the primary data extraction. Second, a secondary coder independently read the entire study and completed a second data extraction, but the primary data extraction was checked for consistencies or inconsistencies throughout the completion of the secondary data extraction. Finally a consensus process was used to settle differences in codes assigned by the primary and secondary coders.

This dual coding and consensus process resulted in removal of approximately 45% of the quantitative studies from consideration in this review. By far, the most typical reason for the removal of studies from consideration was lack of sufficient data reported in the study with which to calculate an effect size. Other less frequently encountered reasons included inadequate specification of the intervention, inadequate specification of the outcome measure, lack of clarity on whether or not the subjects sampled in the study were actually youth with disabilities, and a host of design inadequacies such as an insufficient number of participants or observations in single-participant studies, or lack of any assurances of comparability of groups in non-randomized group design studies. Precise percentages cannot be given for the various reasons for which studies were excluded because once a reason for exclusion was identified, the study was eliminated from consideration and all other possible reasons that might have been present in the study and that might have also resulted in its exclusion were not coded.

The final set of studies that made up the entire database of secondary transition studies numbered 156 studies. At this point an inductive process was used by all staff associated with this review wherein the 156 studies were sorted into a total of six common intervention constructs – life skills (domestic, leisure and community) curricular interventions, social and communicative interventions, vocational interventions, counseling interventions, transition planning interventions and interventions designed to teach self-determination. Thirty studies were identified that conformed with our definitions of social and communicative interventions.

Effect Size Calculations

In order to compute the effect size for multi-group studies a gain score approach was taken. Briefly, the gain between the pretest and posttest for the comparison group was subtracted from the gain between the pretest and posttest for the intervention group and then divided by the

pooled (intervention and control group) standard deviation of the posttest. The pooled standard deviations of the posttest scores were used because, according to Lipsey & Wilson (2001), the standard deviation of the gain scores reflects treatment variability whereas the posttest scores reflect variability on the outcome measure. The formula was as follows:

$$ES_{sg} = \frac{\overline{G}_I - \overline{G}_C}{s_{post\ pooled}}$$

The weight was computed as the inverse variance:

$$w_{sg} = \frac{1}{SE_{sg}^2}$$

Effect sizes were calculated for single subject designs using "Approach One – No Assumptions" put forward by Busk and Serlin (1992). In this method, for each participant, an average of the baseline data points is computed, a separate average of the intervention data points is computed, and the standard deviation of the baseline is computed. The baseline average is then subtracted from the intervention average and divided by the standard deviation of the baseline. Thus a separate effect size is computed for each participant. However, in this systematic review, because we only compute *one effect size per study*, we modified the Busk and Serlin (1992) method by taking a weighted average of the baselines for all of the participants and subtracted a weighted average of the interventions for all of the participants and then divided this result by the *pooled* standard deviation of the baselines of all of the participants.

For the within-subjects designs, we calculated the effect sizes for pre-post contrasts using the standardized mean difference method developed for meta-analyses by Becker (1988) (see Lipsey & Wilson, 2001, p. 44 as well). The effect size for these types of studies, however, depends on the correlation between the pretest and posttest scores. Becker (1988) shows that it can be calculated as:

$$ES_{sg} = \frac{\overline{G}}{s_g \big/ \sqrt{2(1-r)}}$$

where $\overline{G}$ is mean of the gain

where s_g is the standard deviation of the gain

In order to get a weight for each study in this systematic review we used the following formula

from Becker (1988):

$$w_{sg} = \frac{1}{SE_{sg}^2} = \frac{2n}{4(1-r) + ES_{sg}^2}$$

To find the correlation, *r*, for each study for the computation of the effect size and for the weight

for each study in the meta-analysis we needed to estimate it since it was not provided by the

original authors of any of the studies. These *r*-values depended on the standard deviations of the

pretest and posttest scores as well as the standard deviation of the difference scores. We

estimated *r* as follows:

$$r = \frac{(Variance_{pre} + Variance_{post}) - Variance_{diff}}{2\sqrt{Variance_{post} * Variance_{pre}}}$$

We averaged the correlations for 30 studies across all of the systematic reviews in our larger

project that had enough data to compute a correlation, and we calculated this value to be 0.57.

<div align="center">Results</div>

Descriptive Information

Thirty (30) studies were located that fit the intervention, outcome, and sampling selection

criteria for this social and communicative skills review, and whose methodological features met

minimally acceptable standards of internal and external validity as determined through the

consensus coding. Publication dates are inclusive of 1985 - 2003. Table 2 provides detailed

information about sample and setting characteristics, and Table 3 provides study design,

intervention and outcome characteristics. In Tables 2 and 3, we have also grouped the studies by their various intervention foci: using AAC, conversation skills training, social skills training, and functional communication training to replace aberrant behaviors. In the following analysis, information is pulled from both of these tables.

The AAC skills subgroup includes five studies, four of which employed single-participant designs. The single study with a group design was authored by Abrahamsen, Romski, and Sevcik (1989).   The interventions here included instruction in a range of communicative means, from pre-symbolic, intentional communicative behaviors (vocalizations, movements or micro-switch activation) to linguistic (use of symbols on boards, devices, or in books). These studies documented interventions with 21 students with more significant disabilities; sample sizes across these studies ranged from one (Hamilton & Snell, 1993) to 10 (in the Abrahamsen et al. study). Participants include students with autism, deaf-blindness, and severe-profound cognitive disabilities, with a mean age of 17, (range of 15-19 years old).

The earliest study (Sternberg & Owens, 1985) was conducted in a residential institution for persons with disabilities while the most recent were more typically conducted in integrated sites in the community: school, home, community, and vocational sites. The Heller and Allgood (1996) study was carried out exclusively at integrated vocational sites in the community with students with deaf blindness and cognitive disabilities. A variety of strategies were employed across these studies to teach the assorted requesting or commenting skills, including: milieu teaching, prompting, shaping and modified "interrupted chain" procedures (the latter utilized by Sternberg & Owens, 1985), with a range of instructional time invested.

In the *conversation skills* subgroup, there are nine studies. Seven of these studies employed single-participant designs and two used group designs (Lamb, Bibby, & Wood, 1997;

Smith & Griffin, 2002). In the aggregate, these researchers taught conversation initiation and turn-taking skills to some 60 students with a range of abilities and disabilities, including students labeled LD and E/BD (Plienis, Hansen, Ford & Smith, 1987; Smith & Griffin, 2002), and moderate-to-severe intellectual disabilities, or MR. In addition, students with autism (e.g., in the Newman, Buffington, & Hemmes, 1996 study) and other disabilities, including hearing impairments and cerebral palsy also participated (e.g., in the studies by Hughes, Rung, Wehmeyer, Agran, Copeland, & Hwang, 2000; and Hunt, Alwell, & Goetz, 1988). The mean age of these students was 15.36 years, with a range from 14 to 18.67 years. Some of these investigations were conducted in segregated settings (i.e., special schools exclusively for students with disabilities [Lamb et al. 1997]); others took place in integrated high schools, either in special classes, or other settings on the high school campus (e.g., Hunt et al. 1988), while just two were carried out in community sites, primarily at vocational training sites (Hunt, Alwell, Goetz, & Sailor, 1990; and Storey & Alldarice, 1987). One study was implemented with incarcerated youth (Smith & Griffin, 2002).

While the studies included here defined *conversation* in various ways, most agreed on initiations and turn-taking (at least responding to partner queries or comments) as common features. Some incorporated visual referents for students while engaged in conversations with others, such as the conversation books in the Hunt et al. (1988 & 1990) and the Hughes et al. (2000) studies, and magazines in the Downing (1985) study. Visual referents reportedly provided conversation topic ideas, and assisted to clarify atypical speech of students with disabilities for their conversation partners. All of the studies reported acquisition of conversation skills by participants; many also reported generalization of skills to untrained partners and settings. Virtually all employed some type of prompting and feedback to teach conversation

skills, with the group studies also incorporating instructional methods of role playing and rehearsal.

The *decreasing inappropriate behaviors* subgroup includes eight studies. The common factor across them was a focus on functional assessment of problem behaviors and replacement of these with competing or alternative communicative/pro-social behaviors. Two of the studies included here also reported a separate outcome in addition to reducing inappropriate behaviors: conversation skills acquisition, and so are also included with that subgroup (the Hunt et al. 1988 & 1990 studies). The mean age of the students in this subgroup of studies was 16.4 (range of 14.33 – 20.66 years). Inappropriate behaviors reported ranged from silly to bizarre to destructive/aggressive. Predictably, the most serious behaviors described were exhibited by students living in segregated, residential placements (institutions or group homes); many others with milder inappropriate behaviors were taught on integrated high school campuses, either in special education classrooms, or in other locations on the school campus (such as the library or school cafeteria).

The *social skills training* (SST) subgroup represents the largest number of participants across the subgroups included in this review ($n = 210$). This is consistent with the prevalence of curricula for social skills for youth with milder cognitive disabilities and the higher incidence nature of the disabilities themselves. Not surprisingly then, these studies are generally larger and include more group designs than are represented in the other subgroups. In fact, this subgroup includes five studies with group designs. Among these, three different types of designs were employed: two studies used pretest-posttest nonequivalent comparison group designs (Montague, 1988; Ozonoff & Miller, 1995), one used a posttest-only control group design (Malouf, MacArthur, & Radin, 1986) and the final two utilized single group, pretest-posttest designs

(Browning & Nave, 1993; Stermac & Josefowitz, 1985). The remaining five studies with SST

interventions incorporated single-participant designs, specifically multiple baseline across

participants, settings, and/ or tasks.

  Summary. Characteristically, the group design studies in this review generally included

more participants with milder cognitive disabilities (LD and mild MR); in this case, these labels

represented 70% (roughly 224/316) of the participants. The other 30% of participants had these

labels: autism or psychotic disorders, E/BD or conduct disorders, and severe intellectual

disabilities. The mean age of participants across these studies was 14.5, with a range from 13 –

21 years. The most common instructional methods utilized were group training strategies:

videotape modeling, live modeling and discussion, rehearsal, role playing, problem solving, and

use of cue cards. There were just two exceptions: in the first, Staub and Hunt (1993) intervened

with general education high school students, and measured the effects of this indirect

intervention on the social/communicative repertoires of their peers with severe disabilities. In

the second, Stermac and Josefowitz (1985) used board games as the context for teaching social

interactions (Moore, Cartledge, & Heckaman, 1995 also taught game playing/interaction skills,

but with more traditional group teaching methods). All of these studies included various

outcome measures with increases in functional social skills repertoires.

<center>Synthesis Findings</center>

  In Tables 4 – 8 the meta-analytic results for the various studies included in this review are

displayed. As can be seen in Table 4, the mean effect size for the four single participant designs

in the AAC subgroup was 1.89 and was statistically significant ($z = 3.09$; $p = .002$). There is no

interpretive framework available to assess the magnitude of this mean effect size, since Cohen's

(1988) scale applies only to effect size averages derived from meta-analysis of group designed

research. Hence, the only interpretation that can be made with these four studies is that the average effect is positive giving cautious meta-analytical support to the consistently favorable visual analyses of these individual studies (see Campbell, 2004; Horner, Carr, Halle, McGee, Odom, & Wolery, 2005; or Shadish & Rindskopf, 2007, for a discussion of the problematic statistical issues in using traditional *d*-statistic formulae for calculating effect sizes for single-participant designs).

The Q-statistic for this group of four studies, estimating the homogeneity of effect size estimates, was not statistically significant ($Q = .028$; $df = 3$; $p = .999$), suggesting a high level consistency in the findings across the studies. It is worth noting that three of the four single participant studies had confidence intervals that spanned zero, an indication that those particular effect size estimates were not statistically significant in those three individual studies using the formulae we used in our analyses. However, in the aggregate, the four studies had an average effect size with a lower bound well above zero (.69) and a range representing the smallest from among all the four studies.

The other study included in this subgroup (Abrahamsen et al. 1989) employed a between groups design (pretest-posttest control group design) with an effect size $g = -.17$, suggesting a slight, but non-significant finding in favor of the control group. Hence, the overall pattern of findings for this AAC subgroup of interventions is only slightly positive, if at all. We are reluctant to be more positive about the positive effects of AAC interventions because of the lack of an adequate number of group designed studies, the negative effect of the single group design study we do have, the lack of interpretability of the average effect size for the four single-participant studies, and the fact that although the average effect size for these four single-participant studies was positive and statistically significant, it was well below what we have

found for reviews of other interventions using single-participant studies and using the same formula. For example, in Alwell and Cobb (2007), the average effect size across 38 single participant studies of life skills curricular interventions was 6.13, compared to the finding of 1.89 average effect size for AAC interventions.

The *conversation* subgroup was comprised of seven studies with single-participant designs, and two group-designed studies (Smith & Griffin, 2002; Lamb et al. 1997). In calculating the average effect size for the seven single-participant studies, the Q-statistic for these seven studies was statistically significant, indicating a widely heterogeneous set of effect size estimates. On examination of the distribution of effect size estimates, two studies (one of two outcomes in the Hunt et al. 1988 publication; and Hughes et al. 2000) so exceeded the range of the remaining studies that they were removed under the rationale that these particular sub-studies probably did not generalize to the ecological parameters associated with this review.

The remaining five single-participant studies in this subgroup (see Table 5) yielded a statistically significant average effect size of 2.90 ($z = 8.77$; $p < .001$), with a Q-statistic that was not significant ($Q = .189$; $df = 4$; $p = .996$), suggesting homogeneity of effect size estimates. Three of the five single-participant studies had confidence intervals which spanned zero (indicating no statistically significant treatment effect in the three individual studies), yet in the aggregate, the confidence interval lower bound was well above zero (2.26). While cautious interpretation is also warranted here, it appears that these interventions were somewhat effective, at least in these research studies.

The two studies employing group designs in the conversation subgroup were reviewed individually, since there were only two of them, and their designs could not be combined for meta-analysis. Smith & Griffin (2002) employed a pretest-posttest control group design, and

despite the fact that the study yielded a large effect size ($g = .91$) the confidence interval for this

statistic included zero, indicating a non-significant treatment effect (range from -.61 to 2.43). In

contrast, the within subjects crossover design employed by Lamb et al. 1997 while yielding a

smaller effect size ($g = .39$), produced a statistically significant treatment effect with confidence

intervals above zero (range from .0061 to .78). Thus, the combination of six single participant

and two group designed studies lend modest but nonetheless greater support for the efficacy of

conversation interventions than was observed with the AAC interventions reported earlier.

There was a class of studies in this review that focused on *decreasing inappropriate*

social behavior utilizing a variety of interventions such a applied behavior analytic techniques,

(e.g., Hunt et al. 1990), self-management techniques (Embregts, 2000), and other types of

curricular approaches (e.g., Seybert, Dunlap, & Ferro, 1996). Seven of the eight studies in this

subgroup used single-participant designs. We do not report individual study effect size or meta-

analytic results of these seven single-participant studies, however, because the manner in which

we calculated effects sizes would almost necessarily severely underestimate the true effects of

these interventions and create a meta-analytic conclusion with Type II error properties. For

example, a prototypical single-participant study designed to reduce inappropriate behaviors

regardless of the nature of the intervention would demonstrate a baseline trend line of increasing

frequencies until the treatment period, and a treatment condition trend line of decreasing

frequencies over observations if the treatment were effective. However, an effect size estimate

of a study exhibiting this pattern of findings could easily be negligible or zero invalidating the

formula for these types of studies. All that we are comfortable to report is that the authors of

every one of these seven studies reported positive results using visual inspection of the graphed

data; the level changes and slope of the trend lines indicated gradual or even dramatic decreases in the occurrence of inappropriate behaviors over time.

There was also one study in the decreasing behavior subgroup that employed a one group pretest-posttest design (Masia, Klein, Storch, & Corda, 2000). This study had a statistically significant treatment effect ($g = 1.98$) with a confidence interval well above zero (range from .63 to 3.32). The intervention was designed to reduce socially phobic behaviors in students with mild disabilities.

Finally, in the *social skills training* (SST) subgroup, there were five single-participant studies, yielding an average treatment effect size of 2.25 which was statistically significant ($z = 4.61$; $p = .001$). Results of the meta-analysis for these studies are presented in Table 6. The Q-statistic was not significant ($Q = 1.03$; $df = 4$; $p = .91$), again indicating a very homogeneous group of effect size estimates. The confidence interval bounding the average effect size for these five studies was positive, with the lower bound well above zero (1.29), despite the fact that four of the five effect sizes for the individual studies had confidence intervals including zero.

The social skills (SST) training subgroup also included three studies with between groups designs (see Table 7). The Q-statistic was also not significant for this subset; ($Q = 2.97$; $df = 2$; $p = .226$), while the average effect size for these three studies was significant ($z = 4.8$; $p < .001$). In aggregate, these three studies had confidence intervals with the lower bound well above zero (.65).

This SST subgroup also had two studies with one group pretest posttest designs (see Table 8). The variation of effect size estimates across these two were homogenous ($Q = .098$; $df = 1$; $p = .75$) and the average effect size across the two studies was significant ($z = 6.21$; $p < .001$) with a positive confidence interval (range from .42 to .80). Because there were so few

studies in each design category in the SST subgroup, the results are not trustworthy individually. The value of these analyses is in the consistently positive pattern of treatment effects across the three design types. The overall pattern is that SST interventions do appear to result in at least modest treatment gains.

Discussion

What substantive and theoretical conclusions can be drawn from this review when compared with other prior work with similar intervention foci? First, our best evidence is in the social skills training intervention area, and here, our findings are more divergent than convergent with prior meta-analytic work. While Forness and Kavale (1996), Mathur et al. (1998), Quinn et al. (1997), Maag (2005) and Forness et al. (1997) all found, at best, very modest support for SST particularly with students with mild to moderate disabilities, our findings seem more hopeful. Although with admittedly only a handful of studies, our average effect sizes for both types of group designs were 1.10 and .42 for between groups and one group pretest-posttest studies respectively. These are not "at best, modest" average effect sizes. Too, the average effect size for the five single-participant studies was 2.25 – a value whose specific magnitude is not very interpretable, but positive nonetheless. Perhaps SST interventions work better with secondary aged students, or perhaps the real effects of SST interventions are only discernable when only relatively well-designed studies are examined in the aggregate. Conversely, it is entirely possible that our findings are the outliers – a possibility we certainly cannot rule out given the small number of studies that made it through our inclusionary criteria. All we can conclude is that our review supports the efficacy of SST interventions with secondary aged youth with disabilities across all design typologies.

Second, our findings on the efficacy of AAC interventions are somewhat more consistent with prior reviews (cf. Lancioni et al. 2001). Again, we had only four single-participant studies from which to draw our conclusions, and the magnitude of our effect size estimate is not very interpretable, but our average effect size estimate is homogeneously positive, albeit modest.

Third, we found even more support for interventions designed to enhance conversation skills of students with disabilities. Despite the removal of two single-participant studies whose effect sizes were extraordinarily high, the average effect size for the remaining five studies was the highest from among the three subgroups of intervention types (2.90), and the two very well-designed group studies on this intervention (Lamb et al. 1997; Smith & Griffin, 2002) provide consistently strong support as well. We found no prior meta-analyses focusing on this particular type of social/communicative intervention upon which to compare our findings, and encourage the field to examine this intervention sub-type more closely.

Finally, we are frustrated with our inability to draw aggregate conclusions about the efficacy of behavior-analytic interventions that are designed to reduce inappropriate social behavior. This frustration is methodological, as we would not have been able to generate valid effect size estimates with other methods, such as percentage of non-overlapping data point techniques. We are excited to see new theoretical work in this area (cf. Campbell, 2004; Horner, Carr, Halle, McGee, Odom, & Wolery, 2005; Shadish & Rindskopf, 2007), and are particularly interested in the development of techniques using interrupted time-series modeling in other fields. For example Grilli, Ramsay, and Minozzi, (2007) completed a Cochrane Collaboration review of mass media interventions in the health care industries and reported the use of time series techniques for calculating effect sizes for single case interventions (p. 4), and Ramsay,

Matowe, Grilli, Grimshaw, and Thomas (2004) also reported using similar techniques in a prior methodological piece.

We were also constantly frustrated with the large numbers of studies we had to exclude from our review due to all-too-frequent, relatively minor omissions of information – usually statistical. We exhort journal editors and researchers alike to report effect sizes, or at least ensure the existence of data sufficient to calculate effect sizes in every intervention study that is published from this point forward. This will greatly increase the breadth and depth of the research pool immediately accessible to the meta-analyst, and in turn, the quality of systematic reviews available to the field.

Limitations and Advantages of this Review

With all systematic review work, the reviewer is faced with constructing somewhat arbitrary boundaries within the original research pool to decide what to include and what not to, and what moderator and sensitivity analyses make sense to enable seeing the best representation of the aggregated effects associated with similar interventions and outcomes. The inclusionary parameters for this review were constrained by those set for us in the *What Works in Transition*: *Systematic Review Project*, necessitating combining the literature on high and low incidence disabilities, as well as a wide range of specific interventions that were examined in the research literature against secondary academic outcomes, dropout prevention, and secondary transition outcomes.

There were both advantages and drawbacks to casting such a large net. In terms of the advantages, we believe our broad vantage point has allowed us to see patterns emerge across research design types, interventions and disability groups that typically do not appear in meta-analytic work in special education. In this review, this broad vantage perspective has generated a

conclusion for consistent, albeit modest, empirical support for a broad range of social and communicative interventions for youth with varied ability and disability characteristics, in different kinds of settings.

A second advantage is that this broad view also allows for a comparison of the relative efficacy and utility of various interventions, characterized by the descriptions of their duration and intensity in Table 3, and juxtaposed against the estimates of effect in Tables 4 – 8. Many of these interventions work with what appear to be relatively reasonable investments on the part of teachers and related service providers. Because each of the studies in this review was subjected to rigorous methodological standards in order to be included in this review, readers of this review should have at least somewhat greater confidence that the results are stable and reliable, at least for educational contexts in which these individual studies were conducted. The stability over time of these intervention effects remains unclear as there were not consistent efforts across disability groups and design types to measure and report generalization and maintenance of skills over time. Additionally, while all the studies included in this review met at least minimal standards for methodological adequacy, many of the studies would have been strengthened with additional efforts to increase design quality. For example, the one group pretest-posttest designed studies would have been improved tremendously by adding a control or alternative treatment group if that had been possible, and if not, the effect size estimate would have been much more precise had they simply reported the pretest-posttest correlation. Similarly, the posttest only control group designed studies would have benefited from including pre-measures. Finally, of the studies in this review employing single-participant designs with multiple baseline conditions, none reported random assignment of participants to baseline conditions, a relatively

simple design step that can enhance, at least somewhat, the generalizeability of the results of these studies.

Third, the broad vantage point also allows for different kinds of comparisons than typically found in more traditional, single-intervention reviews. For example, it is clear that practitioners employing SST have something to gain from examining the low incidence intervention literature in social/communication skills acquisition; that is, there appears to be value to paying close attention to matching social skills interventions to individual students' skill deficits (now being called replacement behavior training, or RBT, in the high incidence literature) and exploring whether increasing duration and intensity of treatment leads to stronger, more sustained treatment effects. Too, perhaps disassembling packaged interventions is warranted, to discover which components work better than others.

Clearly, as well, there are also limitations to the criteria we established for including studies in this review. Even though our literature acquisition net was cast broadly, our methodological and secondary aged sampling inclusionary criteria eliminated many studies, and the resultant pool of research with secondary youth with disabilities using AAC, for example, was unfortunately too small to be adequately representative of the efficacy of these interventions. It is likely that recasting the net to include children and adult AAC users might yield a different estimate of effect. That said, the need for more empirical work with secondary youth with disabilities using AAC and AT to increase quality participation in secondary settings and with measured effects on transition outcomes is highlighted. Likewise, the number of studies measuring interventions designed to teach conversation skills and social exchanges to youth with identified disabilities is small, with only two studies employing group designs; and no studies were captured employing social stories with youth with autism (more research needed in this

area as well). The single study captured that incorporated training with general education peers and then measured outcomes with youth with identified disabilities (Staub & Hunt, 1993) is intriguing, and points to the need for more research in this area.

In conclusion, we return to Paula Kohler's notion of a *transition-focused* education. In truth, we serve secondary youth with disabilities for a handful of school years, in comparison to the adult lives we send them to upon exiting the public school system. We have an ethical responsibility to make the most of their time in school. In this context, we are challenged as a field to make paramount issues of social validity in all our research efforts. While teachers may quite practically rely on suppressing inappropriate student behaviors to gain classroom control, for example, investing the time and energy to actually assess and teach replacement social and communication skills and empower students meets this same end, but with different and essential outcomes for youth. This review affirms this important challenge for youth with disabilities: promoting the acquisition, performance, and generalization of pro-social behaviors; reducing competing problem behaviors, and enhancing interpersonal relationships with peers and adults; thus ultimately improving transition outcomes and overall quality of life for youth with disabilities.

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Table 1

Standards and Focusing Questions Used to Assess Methodological Adequacy of Differing Types of Designs

DIAD Internal Validity Standards				DIAD External Validity Standards			
Relevance to Review		Clarity of Causal Inference		Generality of Findings		Precision of Outcome Testing	
Intervention Specification	Outcome Measure	Fairness of Comparison	Lack of Contamination	Ecological Validity	Sub-Group Analyses	Testing of Assumptions	Statistical Reporting
Coding Questions for Studies Using Group Designs							
How would you rate the alignment of the intervention to commonly held ideas of the intervention or approach? How would you rate the implementation and replicability of the intervention or approach?	How would you rate the adequacy with which the outcome measure was defined	How would you rate the adequacy with which participants in the comparison or alternative treatment group(s) were made comparable to those in the treatment group?	How would you rate the adequacy with which the study controlled events that happened concurrently with the intervention or approach that might have confused its effect(s)?	How would you rate the adequacy with which the actual sample, setting, outcome(s), and measurement processes reflected the theoretical population and typical norms for settings, outcomes, and measurement processes?	How broadly was the intervention tested statistically across important subgroups of students and across substantive variations within the intervention as a whole?	How thoroughly were the assumptions underlying the statistical analyses for the study reported?	How adequately were the data described, analyzed, and depicted such that effect size for the outcome in this extraction can be calculated?

Table 1 (continued)

Standards and Focusing Questions Used to Assess Methodological Adequacy of Differing Types of Designs

DIAD Internal Validity Standards				DIAD External Validity Standards			
Relevance to Review		Clarity of Causal Inference		Generality of Findings		Precision of Outcome Testing	
Intervention Specification	Outcome Measure	Fairness of Comparison	Lack of Contamination	Ecological Validity	Sub-Group Analyses	Testing of Assumptions	Statistical Reporting
Coding Questions for Studies Using Single Participant Designs							
How would you rate the alignment of the intervention to commonly held ideas of the intervention or approach? How would you rate the implementation and replicability of the intervention or approach?	How would you rate the reliability of the observable behaviors?	How would you rate the process by which participants in the study were selected?	How would you rate the adequacy with which events that happened concurrently with the intervention or approach that might have confused its effect were controlled?	How would you rate the external validity of the study?	How broadly was the intervention tested statistically across important subgroups of students and across substantive variations within the intervention as a whole?	Not applicable	How adequately were the data described, analyzed, and depicted such that effect size for the outcome in this extraction can be calculated? How well could a visual analysis be performed?

Table 1 (continued)

Standards and Focusing Questions Used to Assess Methodological Adequacy of Differing Types of Designs

DIAD Internal Validity Standards				DIAD External Validity Standards			
Relevance to Review		Clarity of Causal Inference		Generality of Findings		Precision of Outcome Testing	
Intervention Specification	Outcome Measure	Fairness of Comparison	Lack of Contamination	Ecological Validity	Sub-Group Analyses	Testing of Assumptions	Statistical Reporting
Coding Questions for Studies Using Qualitative Designs							
How would you rate the construct validity of the intervention or approach?	Not applicable	How would you rate the adequacy with which the rationale was made for how the participants in the study were selected?	How would you rate the adequacy with which design techniques were used to establish the credibility of the study?	How would you rate the transferability of the study?	Not applicable	How would you rate the transparency of the data analysis strategy(s)?	How would you rate the transparency of the data collection and methods?

Table 2

Sample and Participant Characteristics

Intervention Subgroup	Study	Sample Size	Setting	Participant Characteristics		
				Disability Label	Mean Age or Grade	Percent Female
Augmentative Communication Intervention	Abrahamsen, Romski, & Sevcik (1989)	10	Residential facility	Severe MR & related dis abilities: CP, autism, hearing loss, Down syndrome	16.42 years	No gender information given
	Hamilton & Snell (1994)	1	Special ed. classroom and surrounding area, school cafeteria, surrounding community, home	Autism	15 years	0%
	Heller & Allgood (1996)	5	Vocational training sites: drugstore, greenhouse, grocery store, restaurant, hair salon, hospital, and amusement park.	Mild to severe MR & Dual Sensory Impairments: Low vision and moderate to profound hearing impairment	17.90 years	67%
	Kennedy & Haring (1993)	2	Special classes in typical public schools in Santa Barbara, CA	Profound multiple disabilities	19	50%
	Sternberg & Owens (1985)	3	Residential institution for profound MR students	Profound MR	17.66 years	0%
Conversation Interventions	Downing (1985)	3	Center school for students w/moderate to severe cognitive disabilities within public school system (urban)	Moderate MR	15.67 years	66.7%
	Hughes, Rung, Wehmeyer, Agran, Copeland, & Hwang (2000)	5	Classrooms and lunchroom in large urban comprehensive HS	MR w/ secondary dis: speech/ language, autistic-like behaviors, hearing impairment	16.6	20%

Table 2

Sample and Participant Characteristics (continued)

Intervention Subgroup	Study	Sample Size	Setting	Participant Characteristics		
				Disability Label	Mean Age or Grade	Percent Female
Conversation Interventions (continued)	Hunt, Alwell, & Goetz (1988)	3	High school classroom for children with severe disabilities, on regular high school campus	Severe disabilities (MR plus CP, MR, MR, aphasia)	15.33 years	67%
	Hunt, Alwell, Goetz, & Sailor (1990)	3	Variety of classroom and school settings, job sites during work breaks (urban, northern CA)	Severe disabilities	17.67 years	67%
	Lamb, Bibby, & Wood (1997)	29	Special schools for children w/mod. learning difficulties in Nottingham, England	MR	14 years	37%
	Newman, Buffington, & Hemmes (1996)	3	Special class in public school -urban (NYC)	Autism	not given	0%
	Plienis, Hansen, Ford, Smith, Stark, & Kelly (1987)	3	high school classroom at special school for adolescents w/ EBD	EBD	18.67	67%
	Smith & Griffin (2002)	8	Incarcerated youth at Diagnostic Development Center in Albuquerque, NM	LD in oral language skills, BD	15-18 years	0%
	Storey & Allardice (1987)	3	Vocational training site in community: nursing home (where students work)	MR	17-18 years	100%
Decreasing Inappropriate Behavior Interventions	Durand & Kishi (1987)	3	State institution with segregated program, and group home/segregated school	Severe to profound MR, with dual sensory impairments	20.6 years	40%
	Embregts (2000)	3	Residential facility in the Netherlands	Mild MR	16 years, 9 months	0%

Table 2

Sample and Participant Characteristics (continued)

Intervention Subgroup	Study	Sample Size	Setting	Participant Characteristics		
				Disability Label	Mean Age or Grade	Percent Female
Decreasing Inappropriate Behavior Interventions (continued)	Horner, Day, & Day (1997)	3	Kitchen and living rooms of 24 hr group homes	Autism, severe MR & secondary disabilities, including cerebral dysgenesis, and bilateral hearing loss	14.33 years	0%
	Hunt, Alwell, & Goetz (1988)	3	High school classroom for children with severe disabilities, on regular high school campus	Severe disabilities (MR plus CP, MR, MR, aphasia)	15.33 years	67%
	Hunt, Alwell, Goetz, & Sailor (1990)	3	Variety of classroom and school settings, job sites during work breaks	Severe disabilities	17.67 years	67%
	Masia, Klein, Storch, & Corda (2000)	6	Regular public HS in Long Island, NY	BD	15.2 years	50%
	O'Neill & Sweetland-Baker (2001)	1	Various locations within student's special education classroom	Autism/severe MR	15 years	0%
	Seybert, Dunlap, Ferro & Smith (1996)	3	Large vocational classroom, courtyard on school campus (regular HS) at a table	Moderate-Severe MR and challenging behaviors	16.67 years	33%
Social Skills Training Interventions	Baum, Clark, McCarthy, Sandler, & Carpenter (1987)	4	Adolescent Day Treatment Program at Florida Mental Institute, 2 separate rooms outside of classrooms	Conduct Disorder (socialized, non-aggressive, one aggressive)	13 years	0%
	Browning & Nave (1993)	98	Special classrooms in 12 public schools	EMR and LD	17 years	No gender information given

Table 2

Sample and Participant Characteristics (continued)

Intervention Subgroup	Study	Sample Size	Setting	Participant Characteristics		
				Disability Label	Mean Age or Grade	Percent Female
Social Skills Training Interventions (continued)	Duan & O'Brien (1998)	3	Living room of group home	MR	19 years	33%
	Hall, Dineen, Schlesinger, & Stanton (2000)	3	Treatment facility: examination rooms in Child Development and Mental Retardation Center	Mild-Moderate MR	21 years	33%
	Malouf, MacArthur, & Radin (1986)	31	Large suburban high schools	LD and mild MR	10th-11th grade	Exact # not stated, but matching procedure included gender
	Montague (1988)	49	Special education classes	Not stated- but groups matched on disability labels	10th-12th grade	Exact # not specified, but two groups equal on gender
	Moore, Cartledge, & Heckaman (1995)	3	Self-contained urban school for EBD	EBD	14.3 years	0%
	Ozonoff & Miller (1995)	8	Not stated, in Utah	Autism	13.8 years	0%
	Staub & Hunt (1993)	4	HS campus, usually just outside special education classroom	Severe MR, moderate MR, mild MR w/ multiple orthopedic disabilities, CP with mod. MR	16.3 years	50%

Table 2

Sample and Participant Characteristics (continued)

Intervention Subgroup	Study	Sample Size	Setting	Participant Characteristics		
				Disability Label	Mean Age or Grade	Percent Female
Social Skills Training Interventions (continued)	Stermanc & Josefowitz (1985)	7	State institution for persons with disabilities	Autism, behavior disorders, a variety of psychotic disorders	13-17 years	Exact # not stated

Table 3

Social/Communicative Interventions, Designs, Features, Duration and Intensity, and Outcomes

Intervention	Studies	Designs	Intervention features	Duration/ intensity	Outcome features
Augmentative Communication Interventions	Abrahamsen, Romski, & Sevcik (1989)	Between groups design: Pretest-posttest control group ($n = 10$; severe MR and MD)	Teaching lexicons on augmentative communication system and measuring generalized effects	1 hour/day, 5days per week for approx. 18 months	Increases in task attn, sociability, and intentional communication through acquisition of lexicons
	Hamilton & Snell (1994)	Single-participant design: MB x settings ($n = 1$; autism)	Milieu approach and prompts to increase spontaneous communication book use in classrooms, cafeteria, community, and home (mostly requests for activities or food)	40-90 (5-30 second) sessions	Increased communication book use in all areas except home/ concomitant decrease in inappropriate behavior
	Heller & Allgood (1996)	Single participant design: MB x participants with reversal (B-A-B) ($n = 5$; mild – severe MR and dual sensory impairments)	System of least prompts used to teach use of dual communication boards (expressive and receptive) to Ss	10 – 20 sessions over 10 months	Increase in communication responses using communication boards
	Kennedy & Haring (1993)	Single participant design: Multiple probe with alternating treatments ($n = 2$; profound MD)	Prompting strategy to teach students to activate request (e.g., "*Let's do something else.*" recorded on tape player) for new stimuli in social situations with peer and assorted toys/ games.	3-5 (25-40 minute) sessions /week for 10 weeks	Acquisition of choice making using micro-switch (control over stimulus presentation)

Table 3

Social/Communicative Interventions, Designs, Features, Duration and Intensity, and Outcomes (continued)

Intervention	Studies	Designs	Intervention features	Duration/ intensity	Outcome
Augmentative Communication Interventions (continued)	Sternberg & Owens (1985)	Single participant design: MB x participants (*n* = 3; profound MR)	Coactive movement routines are context for teaching through prompting/shaping a signal to continue activity when interrupted	55-70 ten- minute sessions	Acquisition of expressive signa movement) to reinstate coactive
Conversation Interventions	Downing (1985)	Single participant design: reversal (ABAB) and replications with two additional participants (*n* = 3; moderate MR)	Verbal explanation and prompting with time delay	20 min./day, 4 days/week for 9 weeks	Conversational competence: cuing the listener to speak (topic initiation and turn-taking)
	Hughes, Rung, Wehmeyer, Agran, Copeland, & Hwang (2000)	Single participant design: MB x participants (*n* = 5, moderate-severe MR and associated disabilities)	Peer trainers provided structured (prompting strategy) turn-taking w/ conversation book	10-45 (5-13 minute) sessions	Increase in social interactions and conversation skills with variety of ND peer partners
	Hunt, Alwell, & Goetz (1988)	Single participant design: MB x participants (*n* = 3; moderate-severe MR and associated disabilities)	Prompt/fade; differential reinforcement to teach students to use conversation book with variety of ND peer partners	50-80 (10 minute) sessions	Increase in conversation (initiation and turn-taking) skills
	Hunt, Alwell, Goetz, & Sailor (1990)	Single participant design: MB x participants (*n* = 3; moderate-severe MR and associated disabilities)	Prompt/fade; differential reinforcement to teach students to use conversation book with variety of ND peer partners	60 (8 min.) sessions	Generalized increase in conversational competence (initiations and turn-taking with untrained peer partners)

Table 3

Social/Communicative Interventions, Designs, Features, Duration and Intensity, and Outcomes (continued)

Intervention	Studies	Designs	Intervention features	Duration/ intensity	Outcome features
Conversation Intervention (continued)	Lamb, Bibby, & Wood (1997)	Within subjects design: crossover (n = 29; moderate MR)	Reminding, prompting, and giving feedback through praise and reassurance.	12 weekly one hour sessions	Increase in communication skills: answering, asking and checking for understanding
	Newman, Buffington, & Hemmes (1996)	Single participant design: reversal (n = 3; autism)	Prompt/fade; differential reinforcement with emphasis on self-monitoring and reinforcement	40 daily sessions that were 5 -7.5 min. in length	Increased levels of appropriate "conversation"- in this case, comments and responses with adults after hearing a short story read aloud
	Plienis, Hansen, Ford, Smith, Stark, & Kelly (1987)	Single participant design: MB x behaviors (n = 3; E/BD)	Group training: Skill instruction, modeling, behavioral rehearsal, feedback, and shaping procedures (conversation and social problem solving)	22 sessions, held twice weekly for 45 minutes	Increased conversational skills: questions, high interest comments, self-disclosure, responses to partner queries
	Smith & Griffin (2002)	Between groups design: Pretest-posttest control group (n = 8; LD and E/BD)	Group format: tangible rewards for introducing, maintaining or expanding a topic (without book or other visual referent)	Six 45-min. sessions over a 3-week period	Acquisition of conversation skills: eye contact, head nodding, asking questions, taking the perspective of others
	Storey & Allardice (1987)	Single participant design: MB x participants (n = 3; MR)	Student/teacher role-play, then cue/correction procedure with least to most prompts	3-14 training sessions distributed over times at work	Increased use of appropriate greeting steps and number of topics of conversation with co-workers

Table 3

Social/Communicative Interventions, Designs, Features, Duration and Intensity, and Outcomes (continued)

Intervention	Studies	Designs	Intervention features	Duration/ intensity	Outcome features
Decreasing Inappropriate Behavior Interventions	Durand & Kishi (1987)	Single participant design: MB x participants (*n* = 3; severe-profound MR and dual sensory impairments)	Behavior management and curriculum design: taught students to use signs or tokens as means of communication through prompting and shaping procedures	3-5 days	Decrease in problem behavior and increase in functional communication (e.g., break requests, requests for attention)
	Embregts (2000)	Single participant design: MB x participants (*n* = 3; mild MR)	Videotaping and self-management package	Between 103 and 179 days	Reduction in inappropriate social behavior
	Horner, Day, & Day (1997)	Single participant design: Reversal (ABAB) (*n* = 3; severe and multiple disabilities)	Taught clients to replace inappropriate behaviors with requests for and participation in "neutralizing routines" such as taking a nap, drawing pictures, writing repetitive phrases, reviewing a yearbook, and rescheduling events on calendar	40 instructional sessions: held 1-3x/week for 15 minutes	Reduction in problem behaviors
	Hunt, Alwell, & Goetz (1988)	Single participant design: MB x participants (*n* = 3; moderate-severe MR and associated disabilities)	Prompt/fade; differential reinforcement	50-80 (10 minute) sessions	Decrease in inappropriate social interaction behaviors (Increase in conversation [initiation and turn-taking] skills)

Table 3

Social/Communicative Interventions, Designs, Features, Duration and Intensity, and Outcomes (continued)

Intervention	Studies	Designs	Intervention features	Duration/ intensity	Outcome features
Decreasing Inappropriate Behavior Interventions (continued)	Hunt, Alwell, Goetz, & Sailor (1990)	Single participant design: MB x participants (*n* = 3; moderate-severe MR and associated disabilities)	Prompt/fade; differential reinforcement	60 (8 min.) sessions	Generalized effects of reduction in inappropriate social interaction behaviors [and increase in conversation skills]
	Masia, Klein, Storch, & Corda (2000)	Single group pretest-posttest design	Group training conducted over 14 sessions: Skills for Academic and Social Success, SET-C, *Overcoming Shyness and Social Phobia*, CBGT-A	14 sessions	Decrease in social anxiety
	O'Neill & Sweetland-Baker (2001)	Single participant design: MB x settings/ tasks (*n* = 1; autism and severe MR)	Following tasks- verbal praise, gesture/physical prompting, decreasing to facilitate independence	8-10 sessions for 10 min. each	Reduction in disruptive behaviors and acquisition of requests for a break
	Seybert, Dunlap, Ferro, & Smith (1996)	MB x subjects with Reversal (ABAB) components (n = 3; moderate- severe MR and BD)	Taught choice-making and measured effects on task performance	Two 7-minute tasks, distributed over 20 - 28 sessions	Decrease in problem behaviors for 2/3 subjects in MB design, and 2/3 subjects in reversal design (increase in choice making)

Table 3

Social/Communicative Interventions, Designs, Features, Duration and Intensity, and Outcomes (continued)

Intervention	Studies	Designs	Intervention features	Duration/ intensity	Outcome features
Social Skills Training Interventions	Baum, Clark, McCarthy, Sandler & Carpenter (1987)	Single participant design: MB x participants (*n* = 4; E/BD)	Group training : role-playing, modeling and rehearsal	10 sessions	Increase in social skills and self relaxation
	Browning & Nave (1993)	Between groups design: Single group pretest-posttest design (*n* = 98; mild MR and LD)	Social problem solving group curriculum through *cognitive behavior modification*, strategies included video training, slides, discussion, role-playing	One class period per day for 5 days	Increase in social problem solving skills
	Duan & O'Brien (1998)	Single participant design: MB x participants (*n* = 3; MR)	Cue cards, modeling, rehearsal, feedback (provided by coached peer tutors)	2-4 times per week for a total of ten (30-60 minute) sessions	Increased social skills (demonstrated in group home)
	Hall, Dineen, Schlesinger, & Stanton (2000)	Single-participant design: MB x tasks and participants (*n* = 3, mild- moderate MR)	Group instruction: provision of information, modeling, behavioral rehearsal, feedback, homework assignments	1 hr/day; 4 days/week for 6 weeks	Increase in conversation and related social/ communicative skills, as follows: 1. Conversation; 2. Asking someone to social event; 3. Saying no to request; 4. Giving criticism; 5. Differing in opinion; and 6. Receiving criticism.

Table 3

Social/Communicative Interventions, Designs, Features, Duration and Intensity, and Outcomes (continued)

Intervention	Studies	Designs	Intervention features	Duration/ intensity	Outcome features
Social Skills Training Interventions (continued)	Malouf, MacArthur, & Radin (1986)	Between groups design: posttest only control group design (*n* = 31; mild MR)	Videotape, workbooks, discussion; social skills at work	45 min./day for 2 weeks	Increase in social skills as measured by oral curriculum-referenced test, such as asking for help and role playing
	Montague (1988)	Between groups design: pretest-posttest non-equivalent comparison group (*n* = 49; mild- moderate disabilities)	Rehearsal, scripted lessons, cue cards, simulation activities/ social skills at work	Ten scripted lessons over 10 weeks, 3 days per week	Perceived increase in social skills
	Moore, Cartledge, & Heckaman (1995)	Single participant design: MB x subjects, settings, and behaviors (*n* = 3; E/BD)	Instruction for appropriate reactions to winning and losing taught through 5 steps: rationale, modeling, role-play, personal experience, and homework assignments	23 sessions over 5.5 week period; 4-5 times per week for 30 min.	Improvement in game-related social skills (reactions to peers [with disabilities], winning, and losing)
	Ozonoff & Miller (1995)	Between groups design: pretest-posttest non-equivalent comparison group (*n* = 8; autism)	Group lessons, modeling, role-play, videotape role-play, discussion	14 (90 minute) sessions distributed over 4.5 months	Increase in ability to take perspective of others

Table 3

Social/Communicative Interventions, Designs, Features, Duration and Intensity, and Outcomes (continued)

Intervention	Studies	Designs	Intervention features	Duration/ intensity	Outcome features
Social Skills Training Interventions (continued)	Staub & Hunt (1993)	Single participant design: MB x participants (*n* = 4; various severe disabilities)	Information about different abilities in general, and atypical communication skills of individual students in particular, given to ND peer tutors—changes in social interaction behaviors then measured in the students with disabilities with informed peer partners	5 twenty-minute sessions over 5 consecutive days	Increase in appropriate social skills
	Stermac & Josefowitz (1985)	Single group design: pretest-posttest (*n* = 7; autism and/or severe E/BD)	Social skills board game-players earn points by solving/role-playing social situations encountered on board	Two 1- hour sessions per week for 14 weeks	Increase in social skills, decrease in "bizarre" behavior by participants

Table 4

Meta-Analytic Results of AAC Subgroup – Single-Participant Designs

Study	Participant Scores			Effect Size	Confidence Interval	
	n	*M₁*	*M₂*	Hedges' *g*	Lower	Upper
Hamilton& Snell (1994)	1	8.43	28.33	2.46	-13.4	18.32
Heller & Allgood (1996)	3	26.67	59.33	2.58	-11.73	16.90
Kennedy & Haring (1993)	2	53.12	62.61	0.62	-20.58	21.82
Sternberg & Owens (1985)	3	1.02	3.04	1.89	.68	3.10
Mean Effect Size				1.89	.69	3.09

Note: M_1 is the participants' average score during baseline and M_2 is the participants' average score during treatment phases of the interventions.

Table 5

Meta-Analytic Results of Conversation Subgroup – Single-Participant Designs

Study	Participant Scores			Effect Size	Confidence Interval	
	n	*M₁*	*M₂*	Hedges' *g*	Lower	Upper
Downing (1985)	3	31.10	47.00	1.17	-14.25	16.58
Hughes, Rung, Wehmeyer, Agran, Copeland, & Hwang (2000)						
Hunt, Alwell, & Goetz (1988)	3	12.40	38.87	3.89	-3.82	11.59
Hunt, Alwell, Goetz, & Sailor (1990)						
Newman, Buffington, & Hemmes (1996)	3	23.75	60.43	2.79	-12.10	17.68
Plienis, Hansen, Ford, & Smith (1987)	3	2.42	5.41	3.03	1.91	4.15
Storey & Allardice (1987)	3	1.65	3.64	2.84	2.03	3.64
Mean Effect Size				2.90	2.26	3.55

Note: M_1 is the participants' average score during baseline and M_2 is the participants' average score during treatment phases of the interventions.

Table 6

Meta-Analytic Results of Social-Skills Training Subgroup – Single-Participant Designs

Study	Participant Scores			Effect Size	Confidence Interval	
	n	*M1*	*M2*	Hedges' *g*	Lower	Upper
Baum, Clark, McCarthy, & Sandler (1987)	4	53.33	92.17	2.55	-14.67	19.78
Duan & O'Brien (1999)	3	3.61	10.00	1.34	-4.06	6.74
Hall, Dineen, Schlesinger, & Stanton (2000)	3	2.58	5.20	1.08	-1.33	3.69
Moore, Cartledge, & Heckaman (1995)	3	1.50	3.82	2.48	1.42	3.54
Staub & Hunt (1993)	4	22.31	36.75	1.14	-11.29	13.57
Mean Effect Size				2.25	1.29	3.21

Note: M_1 is the participants' average score during baseline and M_2 is the participants' average score during treatment phases of the interventions.

Table 7

Meta-Analytic Results of Social-Skills Training Subgroup – Between Groups Designs

Study	Experimental Group			Alternative Group			Effect Size	Confidence Interval	
	n	*M*	*SD*	*n*	*M*	*SD*	*d*	Lower	Upper
Malouf, MacArthur, & Radin (1986)	16	19.70	3.80	17	16.30	5.60	.69	-.02	1.39
Montague (1988)	24	0.85	0.53	25	0.15	0.38	1.50	.86	2.14
Ozonoff & Miller (1995)	5	3.40	3.42	4	0.01	4.20	0.80	-0.61	2.20
Mean Effect Size							1.10	.65	1.55

Table 8

Meta-Analytic Results of Social-Skills Training Subgroup – One-Group Pretest-Posttest Designs

Study	Experimental Group			Effect Size	Confidence Interval	
	n	*M*	*SD*	*d*	Lower	Upper
Browning & Nave (1993)	98	1.31	1.96	.59	.40	.80
Stermac & Josefowitz (1985)	7	5.00	5.54	.73	-.06	1.51
Mean Effect Size				.61	.42	.80