American Journal of Community Psychology, Vol. 25, No. 2, 1997

Feature Article

Primary Prevention Mental Health Programs for Children and Adolescents: A Meta-Analytic Review[1]

Joseph A. Durlak[2] and Anne M. Wells
Loyola University Chicago

Used meta-analysis to review 177 primary prevention programs designed to prevent behavioral and social problems in children and adolescents. Findings provide empirical support for further research and practice in primary prevention. Most categories of programs produced outcomes similar to or higher in magnitude than those obtained by many other established preventive and treatment interventions in the social sciences and medicine. Programs modifying the school environment, individually focused mental health promotion efforts, and attempts to help children negotiate stressful transitions yield significant mean effects ranging from 0.24 to 0.93. In practical terms, the average participant in a primary prevention program surpasses the performance of between 59% to 82% of those in a control group, and outcomes reflect an 8% to 46% difference in success rates favoring prevention groups. Most categories of programs had the dual benefit of significantly reducing problems and significantly increasing competencies. Priorities for future research include clearer specification of intervention procedures and program goals, assessment of program implementation, more follow-up studies, and determining how characteristics of the intervention and participants relate to different outcomes.

KEY WORDS: primary prevention; children; adolescents; meta-analysis; mental health.

[1]This research was supported in part by William T. Grant Foundation Grant 92-1475-92 awarded to the first author. The authors especially acknowledge the statistical contributions of Claudia Lampman.
[2]All correspondence should be addressed to Joseph A. Durlak, Department of Psychology, Loyola University Chicago, 6525 N. Sheridan Road, Chicago, Illinois 60626.

0091-0562/97/0400-0115$12.50/0

Primary prevention is not a new idea. Although interest in primary prevention has been present in this country for over a century (Spaulding & Balch, 1983), translating this interest into effective action is more difficult. Although a few pioneering outcome studies were conducted in the 1950s (Ojemann, Levitt, Lyle, & Whiteside, 1955; and the St. Louis Project, see Glidewell, Gildea, & Kaufmann, 1973), half of all controlled outcome studies have appeared since 1980.

The many challenges involved in demonstrating an effective primary prevention effort in mental health have been discussed by several writers (Heller, Price, & Sher, 1980; Kessler & Goldston, 1986; McGuire & Earls, 1991). For example, there is the difficulty in demonstrating that a negative outcome has *not* occurred, that is, that a clinical disorder has not developed. Research is only beginning to articulate the specific developmental course of major childhood problems, such as conduct disorder, that would permit preventionists to time interventions and assess their impact most effectively. Furthermore, the specific etiologies of behavioral and psychological disorders are unknown and probably multiply determined, suggesting the need for complex, multicomponent programs. Two additional challenges are the relatively low base rates for many disorders which necessitate that large samples be studied and the episodic manifestations of many conditions that require extended and thorough follow-up. In summary, it is not known exactly how or when currently healthy children eventually develop specific psychological problems, making it difficult to plan interventions to prevent future specific dysfunctions.

In response to these dilemmas, many researchers have widened their goals beyond the prevention of specific disorders to include the general modification of emotional and behavioral problems. They have also emphasized the importance of achieving proximal as well as distal program objectives. That is, while prevention over the long term may be the ultimate goal, in the interim it is important to document that the intervention has an immediate positive impact For example, if outcomes include behaviors or indices that signal risk for later problems, and results suggest a reduction in risk levels, then an important proximal objective has been achieved and subsequent dysfunction is less likely. Preventive interventions may also seek to enhance protective factors, which, in general, are positive behaviors or features of the environment that lessen the likelihood of negative outcomes or increase the possibility of positive outcomes. Currently, there is considerable interest in modifying the risk status and enhancing protective factors for target populations (Coie et al., 1993; Hawkins, Catalano, & Miller, 1992; Institute of Medicine [IOM], 1994).

The notion of protective factors suggests a second transformation that has occurred in some primary prevention programs, which is an emphasis on mental health promotion or enhancement. The basic thrust of such programs is to develop important competencies, that is, to promote wellness (Cowen, 1994). An enhancement model assumes that as individuals become more capable and competent, their psychological well-being improves and thus they are better able to withstand or deal with the factors or influences that lead to maladjustment. An important issue in such programs is the relationship between mental health promotion and levels of maladjustment. Does health promotion lead to a reduction in maladjustment?

In summary, over the past several years primary prevention has expanded from a focus on preventing specific problems to include the prevention of emotional and behavioral dysfunction in general and the promotion of mental health. Therefore, as currently practiced, primary prevention in mental health may be defined as an intervention intentionally designed to reduce the future incidence of adjustment problems in currently normal populations as well as efforts directed at the promotion of mental health functioning.

Conceptualizations of Primary Prevention Programs

Several authors (Coie et al., 1993; Cowen, 1986; Price, 1986) have stressed the need for a systematic model of prevention that would be useful in evaluating alternative approaches. We offer and partially test such a model in this review, but before doing so, it is important to discuss some conceptual features of primary prevention.

At a broad conceptual level, two major dimensions characterize primary prevention (Buckner, Trickett, & Corse, 1985; Cowen, 1986; Jason & Bogat, 1983; Price, 1986). These involve the level of the intervention and the way populations are selected for intervention. The former dimension has two levels and the latter has three, creating six possible approaches. In terms of the level of intervention, programs can be categorized as either person or environment centered (also identified as individual vs. ecological or system-level interventions, respectively). The former offer services directly to the target population without attempting any major environmental change; the latter attempt to change individuals indirectly by modifying the environment. Either approach may emphasize the prevention of specific problems or health promotion.

Person-centered programs work directly with children and often use or adapt change techniques drawn from the clinical and counseling literature, such as social learning and direct instructional approaches. Environmental interventions differ in terms of which aspects of the environment are targeted, and if person–environmental interaction patterns or person–environmental fit are specifically emphasized. Theoretically, environmental interventions can attempt widespread social change at the community or societal level, but controlled primary prevention efforts for children have not been mounted in this regard. Most current environmental programs have sought to modify the social context of the child's home or school situation. For example, interventions attempt to modify parental child-rearing techniques, or teachers' management and organization of the classroom.

The second major distinction in primary prevention consists of the three ways target populations are selected. First, in a universal strategy (also called a global or population-wide approach), all members in an available population receive the intervention. Programs that involve all children in first grade or all students in a junior high school would fall into this category. In a second strategy, groups considered at risk for eventual problems, but who are not yet dysfunctional, are targeted for intervention. Children of alcoholic parents or those from low-income single-parent families may be targeted in this strategy.

The final strategy for selecting target groups involves those about to experience potentially stressful life events or transitions (the transition or milestone approach). The assumption behind this approach is that transitions can produce negative outcomes if they are not successfully negotiated or mastered by those about to experience them. Children about to enter or change schools, or children of separating or divorcing parents, would be suitable candidates for intervention in this approach.

The IOM (1994) has suggested renaming primary prevention for high-risk groups as *selective intervention* and did not include mental health promotion as a primary prevention strategy. We retain the more customary terminology regarding primary prevention. We also evaluate mental health promotion programs because their preventive impact has not been empirically tested.

We explain our model for examining prevention programs more completely as the results are presented, but, in brief, we put to empirical test the notion that person- and environment-centered interventions are critical distinctions that should be maintained for prevention programs. Although preventionists have emphasized this distinction, no clear empirical data have been presented for maintaining this distinction. Models for transition programs have not been empirically tested either. Among person-centered

programs, mental health promotion programs emphasizing similar competencies were separated from other individually focused interventions to assess these differences in program orientation. Finally, in order to understand who will benefit from primary prevention, it seemed logical to consider the characteristics, needs, and competencies of the target population (Lorion, 1990; Roberts, 1986). The developmental level of participants seemed particularly suited as a possible moderator for certain health promotion programs.

We emphasize that the categorical breakdowns of primary prevention presented here are not intended to portray interventions as antagonistic to each other, or as either/or distinctions. Person- and environment-oriented interventions can complement each other and most of the latter include a person-centered component. Therefore, the critical difference in such programs is whether they attempt environmental change. Moreover, some programs are difficult to categorize and could fit into more than one category. The intervention by Felner and Adan (1988) is an example of an environmental, milestone intervention for high-risk youth entering high school, which could be placed into any of three categories. Admittedly, finer distinctions could be made among programs; environmental interventions can be compared for individuals at different levels of risk. There were insufficient numbers of current studies to make such a fine-grained analysis, however.

The major intent of this review was to examine the impact of primary prevention using meta-analytic procedures in an effort to identify variables that moderate program outcomes. To analyze the data, we chose the meta-analytic procedures developed by Hedges and Olkin (1985) which permit model testing. Essentially, this approach permitted us to evaluate if our approach in dividing studies for analysis produced statistically coherent and defensible results. We also assessed the impact of selected methodological variables on outcomes.

A second goal of this review was to examine the types of outcomes achieved by preventive interventions. In particular, we examined if programs were successful in reducing problems and increasing competencies. While the former outcome is an obvious one, programs that enhance competencies may be targeting protective factors that are also important in prevention. For instance, interventions that both decrease problems and increase competencies might ultimately be more effective in lessening the probability of future dysfunction than programs that only reduce problems or symptoms. This is because the former programs may simultaneously be reducing risk and increasing protection in the target population.

METHOD

Studies Reviewed

Studies eligible for review consisted of primary prevention outcome studies targeted at youth: ages 18 or under and reported by the end of 1991. Primary prevention was defined as an intervention designed specifically to reduce the future incidence of adjustment problems in currently normal populations, including efforts directed at the promotion of mental health. To be included in the review each study had to meet the following criteria: (a) adhere to the above definition of primary prevention; (b) involve a control condition of some sort (no treatment, waiting list, or attention placebo controls); (c) be reported by the end of 1991; and (d) be a program with a central mental health thrust, that is, be directed primarily at children's and adolescents' behavioral and social functioning. Educational interventions designed exclusively to affect academic achievement were not included nor were studies to prevent drug use. Slavin, Karweit, and Wasik (1994) and Hansen (1992) have conducted reviews of these respective areas.

Search Procedures. Three procedures were used to locate relevant studies. Literature search procedures began with a computer-generated search of *Psych Lit,* but the overwhelming majority of obtained studies were found through a manual study-by-study search of 15 journals that typically publish articles involving child and adolescent populations.[3] To locate additional studies, the references from each identified study, from texts on prevention, and from various published articles were also examined. In a combination computer and hand search of *Dissertation Abstracts,* 5 years between 1970 and 1990 were randomly selected and four volumes of the *Abstracts* were manually searched for each of the 5 years. Unpublished dissertations were eventually obtained through interlibrary loan.

In a few cases in which multiple studies were described in a single report or distinctly different preventive interventions were evaluated, program results were evaluated separately. The current review is thus based on findings from 177 interventions, 150 from published reports and 27 from unpublished doctoral dissertations.

[3]These journals included: *American Journal of Community Psychology, American Journal of Orthopsychiatry, Behavior Therapy, Cognitive Therapy and Research, Elementary School Guidance and Counseling, Journal of Clinical Child Psychology, Journal of Community Psychology, Journal of Consulting and Clinical Psychology, Journal of Counseling Psychology, Journal of Primary Prevention, Journal of School Psychology, Journal of the American Academy of Child and Adolescent Psychiatry, Prevention in Human Services, Psychology in the Schools,* and *The School Counselor.*

Coding. Each study was coded on 51 variables falling into seven major categories. Examples of variables in each category are (a) basic identifying data (e.g., year of publication and publication status); (b) methodological features (e.g., assignment to conditions, types of controls, sample size); (c) how effect sizes were calculated (e.g., from *M*s and *SD*s, *t*, or *F* values); and characteristics of the (d) subjects (e.g., age, gender, ethnicity); (e) change agents (e.g., their education and training); (f) interventions (theoretical orientation, program goals, components of intervention, modality, duration, fidelity of implementation); and (g) outcome measures (psychometric properties, dimension of adjustment assessed). Explanations of specific codes are offered as the results are presented.

Reliability of Coding Procedures. Three research assistants employed over different time periods coded studies. To assess interjudge agreement, 20 studies coded by each rater (approximately 40% of all the studies each had coded) were selected randomly and compared to those independently coded by the first author who had trained each assistant. The assistants did not know which studies were to be selected for reliability checks. Half of the 20 studies selected for reliability checks were drawn from among the first studies coded by each assistant, and half were drawn from the final group of studies each had coded. Percentage agreement corrected for chance (kappa) indicated that acceptable levels of interjudge agreement were achieved by each rater. Mean agreement across all codes was 0.85, and ranged from 0.75 to 0.99. Coding disagreements were eventually resolved through discussion.

Calculation of Effect Sizes. Effect sizes (ESs) were computed using the pooled standard deviation of the intervention and control groups. The ESs were calculated such that positive scores indicate the treated group was superior to the controls, and negative scores indicate the opposite. When means and standard deviations were not reported, procedures to estimate ESs described by Wolf (1986) were used. When the ES could not be calculated because the author merely reported results as being "nonsignificant," the ES was conservatively set at zero, which occurred for 12 studies. Since 88% of ESs were positive whenever they could be calculated, the presence of zero ESs underestimates the impact of primary prevention. ESs were only calculated on outcomes assessing change in children and adolescents. In other words, no effects were included that measured changes occurring in teachers or parents who participated in the intervention.

Following Hedges and Olkin (1985), ESs were adjusted to correct for bias due to small samples, (chap. 5, Eq. 10), and then weighting procedures were used to combine ESs from different studies by weighting each effect size by the inverse of its variance (chap. 6, Eq. 4). The latter weighting is particularly important to obtain a more efficient estimate of true population effects.

Table I. Descriptive Characteristics of Reviewed Studies (N = 177)

Variable	*n*	%
Primary setting for intervention		
School	129	72.9
General hospital or dental clinic	26	14.9
Combination or other	14	7.8
Home	4	2.2
Not reported	4	2.2
Race of participants		
Majority white	45	25.4
Majority not white	31	17.5
Mixed	16	9.0
Not reported	85	48.0
Description of intervention procedures		
Very broad, few details	94	53.2
Major procedures specified	31	17.5
Program manual available	52	29.3
Specification of intervention goals		
Very broad or general	113	64.0
Specific goals articulated	64	36.0
Change agents		
Mental health professionals	53	29.9
Graduate students	23	13.0
Teachers or parents	37	20.9
Undergraduate students	16	9.0
Combination of above	34	19.2
Not reported	14	7.9
Methodological features		
Randomized designs	108	61.0
Attention placebo controls	40	22.6
Attrition less than 10%	141	80.0
Follow-up data collected	45	25.4
Multiple outcome measures used	159	89.9
Normed outcome measure used	60	33.9

RESULTS

The mean age of participants was 9.3 years (SD = 7.78); 13% of the studies involved adolescents, age 13 or older. There was wide variability in sample sizes (M = 125; SD = 201); 34% of the studies involved samples of 50 of less, whereas 29% involved samples of 100 or more. Forty-five studies (25.4%) collected some follow-up information. Although the average follow-up period was 47 weeks, there was considerable variability (SD = 99 weeks); the follow-up period was 10 weeks or less in 25 of the 45 follow-up reports, and 1 year or longer in only eight studies. Table I presents additional descriptive information on the reviewed studies. The

primary setting for most interventions (72.9%) was a preschool, primary, or secondary school. Nearly half of the studies (48%) did not mention the ethnic or racial characteristics of the target population; however, in 26.5% of the samples either the majority were not white or the sample was evenly divided between white and non-white populations. Several different types of change agents were used including mental health professionals (29.9%), graduate (13%) and undergraduate students (9%), and teachers or parents (20.9%). Neither the intervention procedures nor the goals of many programs were specifically articulated. Only 36% had specific goals such as the prevention of aggression or performance anxiety in a school setting; many program goals could only be categorized in broad or vague ways such as improving personal adjustment or preventing school problems. In a similar fashion, 53% of the intervention procedures were described using very general constructs or descriptors (e.g., nondirective parent training), although 29.3% did indicate that a program manual or standardized protocol guided the intervention.

Distribution of Effect Sizes

Table II presents a stem-and-leaf plot of the unweighted ESs aggregated at the study level (N = 177). ESs ranged from –0.45 to 2.36; only 9 of the 177 programs had an overall negative impact on participants and only three exceeded –0.20. Negative effects did not appear more frequently for any one type of intervention or outcome measure. The stem-and-leaf display in Table II suggests a normal distribution of effects centered around a grand mean of 0.34. However, this distribution was significantly heterogeneous (Q = 327.40, $p < .0001$, see below), indicating the total sample contained more than one population of studies and there was a need to subdivide studies.

General Analytic Approach

The procedures developed by Hedges and Olkin (1985) for fitting categorical, parametric models to effect sizes from a series of independent studies were followed. In this approach, the Q statistical test is used to assess whether or not the effect sizes produced by a group of studies are homogenous, that is, is it reasonable to assume the effects represent a single population of outcomes? When studies are grouped for analysis, a *nonsignificant* Q value is preferred since this finding indicates that variability in ESs is primarily the result of random error and not systematic

Table II. Stem-and-Leaf Plot of All Unweighted Effect Sizes (N = 177)[a]

Stem	&	Leaf
-04	.	5
-03	.	5
-02	.	7
-01	.	4321
00	.	-3-2000000000000+24568899
01	.	0002455567778899999
02	.	0112445667778
03	.	000111222233333444445667888889
04	.	000002456777889
05	.	122346677789
06	.	0111234555688
07	.	12344445588899
08	.	123333336667
09	.	057
10	.	
11	.	23356888899
12	.	024
13	.	2
14	.	
15	.	00

Extreme values: 1.71, 2.10, 2.36; Stem width = .10

[a] The stem width means that the first row should be understood as -0.45 and the last row as 1.50.

differences among studies. If ESs from studies are heterogeneous, however, then the studies need to be subdivided further or another variable needs to be chosen to redivide studies. In other words, the basic challenge facing the meta-analyst is to specify a model (i.e., one or more variables) that will successfully divide a heterogeneous group of studies into homogeneous subgroupings. In effect, the Q statistic guards against the so-called apples and oranges problem in meta-analysis by confirming that studies have been grouped appropriately for analysis.

Once final mean effects for different study groupings were obtained, their significance were determined by calculating 95% confidence intervals around each mean. Means differ significantly from zero if their confidence intervals do not include zero, and differ significantly from each other if their confidence intervals do not overlap (Hedges & Olkin, 1985). In the following two sections we first describe our methodology in dividing studies for analysis since it was complicated, and then we report our findings.

Model Testing: Dividing Studies to Achieve Homogeneity

Figures 1a, 1b, 1c, and 1d illustrate the stages used to divide studies to achieve homogeneity. Unfortunately, the features of current programs limited the types of analyses that could be conducted. For example, Figure 1a presents the number of studies contained in each cell of the 3 × 2 conceptual model of primary prevention described in the Introduction. It was not possible to test this six-cell model completely because of the insufficient numbers of programs using a high-risk selection strategy or using an environmental-level intervention for transition programs. The large majority of interventions were person- rather than environment-centered (*n*s = 150 and 27, respectively) and used a universal or transition approach in selecting target groups (*n*s = 118 and 46, respectively). Among the 46 transition programs, all but 2 were person-centered.

In Stage 1 of the analyses, depicted in Figure 1b, we retained as many features of the original conceptual model as possible. That is, we dropped the distinction between universal and high-risk selection strategies, but retained the transition approach which now became one category consisting of 46 programs. We also created single categories of person- and environment-centered interventions with respective *n*s of 106 and 25. None of these broad study groupings was homogeneous, however, indicating the need to divide studies further.

Figure 1c represents Stage 2 in the analysis. Transition programs were subdivided according to four types of transitions, and environment-centered programs were divided according to their primary setting: home or school. Person-centered programs were divided into those focusing on mental health promotion versus all other programs (henceforth called "Other"). These subdivisions were successful in achieving homogeneity for all but the person-centered programs which needed further subdivision.

Figure 1d indicates the final grouping of person-centered programs. Programs were first divided into two categories or mental health promotion: interpersonal problem-solving or affective education. Homogeneity was not achieved, however, until both program categories were subdivided further according to the child's developmental level. The Other person-centered programs were difficult to categorize. Although some were health promotion programs, these studies focused on different skills or competencies and could not be combined into a single coherent grouping. Homogeneity was achieved by diving studies according to the type of change strategy used: behavioral or nonbehavioral. We should point out that developmental level was not successful in achieving homogeneity for the Other programs and change techniques were similarly not successful in reaching homogeneity for problem solving and affective education.

Level of Intervention

Method of Selecting Target Groups	Person	Environment
Universal	N = 100	N = 18
High-Risk	N = 6	N = 7
Transition	N = 44	N = 2

a

Level of Intervention

Method of Selecting Target Groups	Person	Environment
Universal + High Risk	N = 106	N = 25
Transition	N = 46	

b

Fig. 1. (a) General conceptual approaches to primary prevention. (b) First stage in subdivision of studies. (c) Second stage in subdivision of programs. (d) Subdivision of person-centered programs in the final stage of analysis.

Table III presents mean ESs for the final categories of studies. With only one exception, study groupings produced homogeneous effects, indicating empirical support for our model of primary prevention. These categories are now described in more depth along with some details and findings from representative studies in each area.

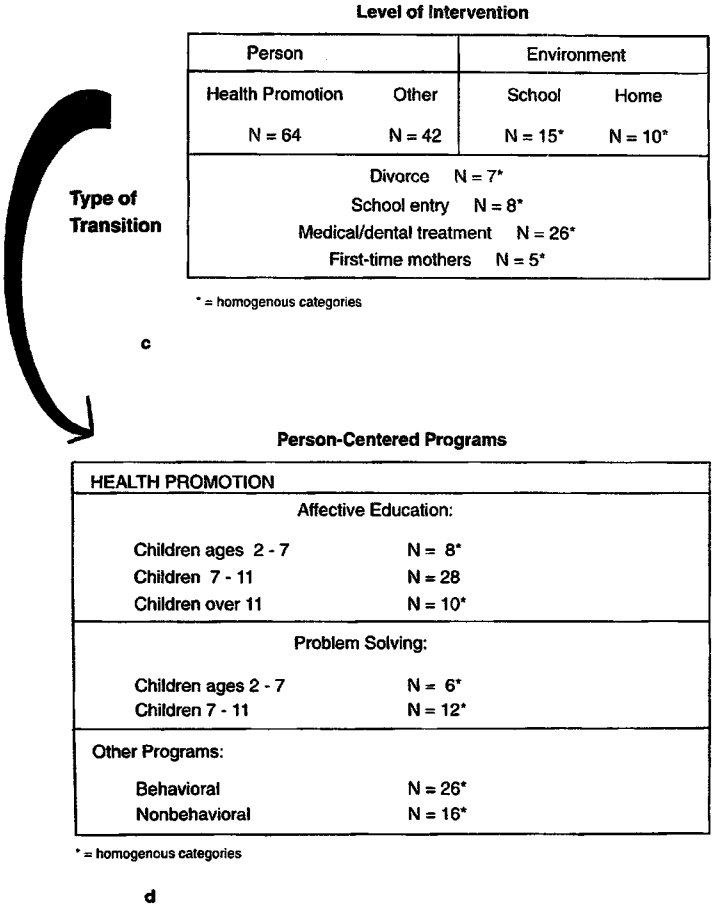

Fig. 1.

Environment-Centered Programs

Fifteen environmental efforts targeted changes in school settings and produced significant positive effects (mean ES = 0.35; see Table III). These programs either modified existing settings for school-aged children

or created new settings for younger children. Several of the latter programs also offer services to parents, but the main focus was the educational setting. All of the interventions in which school settings are changed are multidimensional, but the primary features of some representative programs can be summarized.

Most investigators sought to change the psychosocial aspects of the typical classroom environment. For example, Hawkins, Von Cleve, and Catalano (1991) trained first- and second-grade teachers in effective classroom management procedures, and introduced new interactive teaching strategies that encouraged more supportive and reinforcing contacts between teachers and students; teachers also introduced social skills training procedures into the classroom. This intervention was effective in reducing aggressive behavior in boys and self-destructive behavior in girls.

One intervention at the high school level (Weinstein et al., 1991) modified several classroom features such as curricula, student ability groupings, evaluation procedures, teacher–student relationships, and parent involvement in school activities. These procedures produced significant benefits for at-risk multiethnic high school students in terms of grades, disciplinary referrals, absenteeism, and school dropout rates.

The approach by Comer (1985) was more ambitious in terms of modifying the structure and functioning of an entire elementary school. In this case, teachers, administrators, mental health professionals and parents worked together to govern the school, institute and monitor new policies and procedures, and assess student progress. The overall intent was to develop a positive school culture that addressed both the academic and social needs of students. Begun in 1968, this intervention has been successful in changing the academic achievement levels of participating schools, reducing serious behavior problems, and improving students' sense of personal competence.

Finally, the Houston Project (Johnson & Breckenridge, 1982) is an example of how environmental change can occur through the creation of a new setting: a child development center to serve entire families. Early home-visiting until the child was 1-year-old prepared the family for fuller engagement in child development center activities a year later. At the center, parents learn child-rearing techniques and are offered general support. Adult English-language classes are also available since the Project targets low-income Mexican American families. The 2-year program involves up to 500 hours of family members' time. Process evaluations have indicated that parents change their interactional styles and child-rearing behaviors with their children. Children's cognitive development was enhanced, and the intervention produced significant long-term effects on behavioral adjustment in early elementary school.

Table III. Mean Effect Sizes and 95% Confidence Intervals for Primary Prevention

Type of program	*n*	Mean effect[a]	95% CI
Environment-centered			
School-based	15	0.35	0.30–0.43
Parent training	10	0.16	–0.04–0.36
Transition programs			
Divorce	7	0.36	0.15–0.56
School entry/change	8	0.39	0.27–0.58
First-time mothers	5	0.87	0.66–1.07
Medical/dental procedure	26	0.46	0.35–0.58
Person-centered programs			
Affective education			
Children 2–7	8	0.70	0.49–0.91
Children 7–11	28	0.24[b]	0.18–0.31
Children over 11	10	0.33	0.18–0.48
Interpersonal problem solving			
Children 2–7	6	0.93	0.66–1.19
Children 7–11	12	0.36	0.23–0.48
Children over 11	0	—	—
Other person-centered programs			
Behavioral approach	26	0.49	0.38–0.59
Nonbehavioral approach	16	0.25	0.06–0.44

[a] All means differ significantly from zero except for Parent training.
[b] Only category in which mean effects are heterogeneous.

In the other type of environmental program, parent training was the exclusive focus. These 10 programs primarily sought to modify the child's home situation by educating parents about child development and modifying parental attitudes and child-rearing techniques as needed (e.g., Frazier & Matthes, 1975; Graybill & Gabel, 1981). These programs were homogenous in outcome, but not effective (mean ES = 0.16; see Table III). The mean ES does not differ significantly from zero.

Transition Programs

Four types of transition programs were identified and each produced significant positive outcomes. Five programs targeted first-time mothers and had high effects (mean ES = 0.87). For example, Broussard (1982) offered an extensive support program for new mothers beginning when infants were 2–4 months of age and continuing until the children were age 3 1/2 years. The program combined home visits and periodic group meetings. As another

example, Olds, Henderson, Chamberlin, and Tatelbaum (1986) reported success for a home visiting-nursing program offered to young, single, low-income, first-time mothers. Among other findings, this intervention was successful in reducing reports of child abuse and neglect during the first 2 years of life.

There were seven programs for children of divorce designed to ease the passage of children through this potentially traumatic event (mean ES = 0.36). Typically, these programs are brief, group interventions designed to help children understand and cope with the changes that have occurred in their lives (e.g., Alpert-Gillis, Pedro-Carroll, & Cowen, 1989).

There were eight programs designed to help children during school transitions based on findings that school entry and transition can be a particularly stressful time for children (see Jason et al., 1992). Different types of strategies have been effective (mean ES = 0.39). Berg-Cross and Flanagan (1988) used a counselor-led 6-week group program in which transfer and nontransfer students met for information-giving and problem-solving sessions to help the former students become comfortable with their new school. Sloan, Jason, and Bogat (1984) had older peers at the receiving school lead a 2-day orientation program for incoming students.

Finally, there were 26 programs for children experiencing potentially stressful dental and medical procedures, including first-time hospitalization. Many children display psychological upset in anticipation of, during, and after receiving various medical and dental treatments (Vernon, Foley, Sipowicz, & Schulman, 1965). For example, up to 11% of children display relatively severe behavior problems within 2 weeks of surgery and over 90% of young children manifest anxiety or disruptive behavior in connection with medical treatment (Harbeck-Weber & McKee, 1995). Transition programs for medical and dental patients produced moderately strong effects (mean ES = 0.46; see Table III).

Many of these medical and dental interventions used modeling or desensitization techniques to reduce children's fears and anxieties about upcoming procedures. For example, Peterson and Shigetomi (1981) reported that coping and modeling procedures were successful in helping hospitalized children remain more calm and cooperative during invasive medical procedures. Melamed and Siegel (1975) reported that a brief modeling film reduced fears in hospitalized children undergoing elective surgery and that parents of control children reported heightened behavior problems at home 3–4 weeks after the hospital stay. Finally, both a desensitization and modeling condition significantly reduced negative behavior among young children receiving restorative dental treatment (Machen & Johnson, 1974).

Person-Centered Strategies

Health Promotion Programs. There were two main categories of health promotion programs among person-centered interventions: affective education (n = 46) and interpersonal problem-solving training (n = 18). Affective education attempts to increase children's awareness and expression of feelings and their ability to understand the possible causes of behavior. The assumption is that enhanced capacities in this regard will improve children's social and behavioral adjustment. Affective education typically combines stories, puppet play, music, and various exercises depending on the child's age, and the programs range from a few sessions to lesson plans lasting an entire school year. Most interpersonal problem-solving programs have been influenced by Spivack and Shure's (1974) theory that problem-solving skills are an important part of adjustment. Although programs vary in which specific skills are targeted, these programs generally attempt to teach children how to use cognitively based skills to identify interpersonal problems and develop effective means of resolving such difficulties.

Importance of Developmental Level. Homogeneity was obtained for both affective education and problem-solving only after the participants for each intervention were subdivided according to developmental level. Since researchers did not conduct specific social-cognitive assessments, however, we had to use age as a proxy variable for developmental level. Children ages 2 to 7 years were considered as preoperational, those 7 to 11 as concrete operational, and those 11 or older as formal operations. Affective education and problem-solving programs were most successful with the youngest children (mean ESs of 0.70 and 0.93, respectively). Effects were more modest for older students (mean ESs ranged from 0.24 to 0.36; see Table III). There were no problem-solving programs for children 11 or older. The cell in which affective education was conducted with children at the level of concrete operations was the only one in which effects were not homogeneous. Attempts to produce homogeneity by using other variables were unsuccessful.

Other Programs. The remaining person-centered programs were more difficult to categorize because of the diversity of their procedures and objectives. These programs varied in terms of what problems they were seeking to prevent or what competencies they were promoting. For instance, one focused on assertiveness (Rotheram, Armstrong, & Booraem, 1982); one modified irrational beliefs according to the rational emotive therapy model (Diguiseppe & Kassinove, 1976) in order to reduce anxiety, and one sought to enhance self-esteem and modify school attitudes and behavior by values clarification exercises (Thompson &

Hudson, 1982). Homogeneity was achieved among Other programs by dividing them according to the general change in strategy that was used in the intervention. The 26 programs employing behavioral or cognitive-behavior forms of intervention were nearly twice as effective than the 16 utilizing nonbehavioral techniques (mean ESs of 0.49 and 0.25, respectively). This observed superiority of behavioral over nonbehavioral interventions that occurred across studies was also confirmed by Diguiseppe and Kassinove (1976) and Thompson and Hudson (1982) in within-study comparisons in which behavioral and nonbehavioral interventions were compared. The behavioral techniques used most frequently in Other programs involved modeling, role-playing followed by feedback and reinforcement, and various cognitive-behavior self-control strategies. Nonbehavioral interventions usually consisted of nondirective forms of counseling and group discussion.

In summary, analyses provided strong support for our model of primary prevention. Results for only one study group (affective education for 7- to 11-year-old children) failed to reach homogeneity.

Alternate Analyses

To assess if other models would produce an equal or better fit for the data, we conducted alternative analyses in three different ways. In the successful analyses just described, six variables were used to divide an initially heterogeneous group of 177 studies into smaller homogeneous subgroups (e.g., variables such as the level of intervention, and the selection of populations undergoing transitions). In the first set of alternate analyses, the order in which these six variables were used to subdivide studies was changed. For instance, instead of first dividing studies according to level of intervention and keeping all transition programs together, we divided studies first according to participants' cognitive developmental level and then according to behavioral versus nonbehavioral intervention strategies, and so on. As each variable was added, we examined if homogeneity was achieved in these new study groupings. Different combinations of the six variables were evaluated.

In a second set of alternate analyses, we examined several new variables. For instance, we divided studies according to the duration of the intervention (number of sessions times the average length of session), the characteristics of the change agents (mental health professionals, graduate students, paraprofessionals) and whether the participants were children younger than 13 or were adolescents. Once again, we tried different combinations of variables. Third, we recategorized those studies that could be

Table IV. Mean Effects on Problem- and Competency-Oriented Outcome Measures for Different Programs

Type of program	Outcomes	
	Problems	Competencies
Environment-centered		
School-based	0.26	0.57
Parent training	0.08[a]	0.17[a]
Transition programs		
Divorce	0.38	0.33
School entry/change	0.36	0.41
First-time mothers	0.93	0.81
Medical/dental procedure	0.53	0.62
Person-centered programs		
Affective education		
Children 2–7	0.85	0.69
Children 7–11	0.21	0.21
Children over 11	0.31	0.34
Interpersonal problem solving		
Children 2–7	0.41[a]	1.11
Children 7–11	0.04[a]	0.37
Children over 11	—	—
Other person-centered programs		
Behavioral	0.34	0.50
Nonbehavioral	0.33	0.22

[a] Mean is not significantly different from zero.

placed into more than one category. For example, some studies could be considered either an environmental intervention designed to change the school setting or a transition program for children changing schools (e.g., Felner & Adan, 1988). These studies were switched to other categories and the analyses were repeated. None of the alternative analytic strategies approached the success of our initial model. In particular, homogeneity of effects was not achieved for many categories, suggesting that alternative study groupings did not provide a good fit for the outcome data.

Methodological Variables

To examine the influence of selected methodological variables, we compared the mean ESs of studies containing or not containing the design features listed in Table I (e.g., use of a randomized design, yes/no; use

Table V. Post and Follow-Up Mean Effect Sizes as a Function of Different Outcome Domains

	Post			Follow-up		
Outcome domain	*n*	*M*[a]	CI	*n*	*M*	CI
Problems/symptoms						
Externalizing	80	0.30_a	0.25–0.34	17	0.25	0.14–0.37
Internalizing	40	0.32_a	0.25–0.40	7	0.40	0.20–0.56
Academic achievement	30	0.30_a	0.23–0.38	5	0.29	0.13–0.45
Sociometric status	15	0.07^b	0.00–0.20	3	0.43	0.22–0.64
Cognitive processes	31	0.55_b	0.48–0.62	9	0.43	0.19–0.67
Physiological measures	11	0.69_b	0.43–0.89	3	0.62	0.21–1.02

[a] At post, means in the same column with different subscripts differ significantly from each other at the .05 level.

[b] Only mean effect size not significantly different from zero.

of attention placebo controls, yes/no). The only significant differences occurred in relation to features of the outcome measures. Effect sizes were significantly lower for normed than for nonnormed outcome measures (0.18 vs. 0.40) and for those studies in which only one outcome measure was used compared to those involving multiple outcome measures (0.32 vs. 0.55).

How Participants Changed

To clarify how programs affected patients, we coded outcome measures in two different ways and summarize these data in Tables IV and V. In these analyses each study could contribute one ES for each type of outcome.

Problems and Competencies. First, each measure was coded in terms of whether its outcome reflected a reduction in problems or an increase in competencies. For example, problem-oriented measures assessed anxiety, behavior problems, depressive symptoms, and so on, whereas competency measures assessed assertiveness or communication skills, feelings of self-confidence, or skill performance on various experimenter-developed measures. Because of limited follow-up data, only postprogram data are presented in Table IV. Inspection of confidence intervals (not shown in Table IV) indicated that most categories of preventive programs significantly reduced problems and significantly increased competencies. There were three exceptions to the above findings: Parent training did not significantly modify either problems or competencies, and problem-solving for

children ages 2–7 and 7–11 years did not result in significant reductions in problems, although interventions for both of these age groups did significantly increase competencies. Even though the mean effect for the youngest problem-solving group was 0.41 for problems, its confidence interval included zero (−.04 to +.85). Examining effects within program categories indicated that most types of programs did not produce significantly different results for competency and problem outcomes. Among programs achieving significant changes on both problems and competencies, environment-centered school-based programs was the only category to attain significantly more change on one dimension than the other (mean ESs = 0.26 and 0.57 for problems and competencies, respectively).

Domain of Functioning. Outcome measures were then recoded to reflect six different types of outcomes: externalizing symptoms, internalizing symptoms, academic achievement (measures such as the WRAT-R or school grades), sociometric status (reflecting peer acceptance or rejection), cognitive processes (primarily measures of interpersonal problem-solving skills), and physiological assessments (such as the palmar sweat index or measures of muscular tension). Externalizing symptoms included changes in various behavior problems such as acting-out and oppositionality; internalizing symptoms primarily included self-reported anxiety and depression. Each study did not assess outcomes occurring in each domain, and Table V presents post and follow-up data averaged across all prevention programs. At post, programs produced significant positive effects on each outcome domain except for sociometric status. Significant mean effects ranged from 0.30 to 0.69. Significantly higher effects were attained on physiological and cognitive measures than on the other types of outcomes. These findings were an artifact of the type of intervention conducted, however. Physiological and cognitive variables were used almost exclusively in transition programs designed to lessen fears and anxieties in medical or dental patients and in programs training children in problem-solving skills, respectively. In other words, these specific forms of outcomes are only appropriate for certain types of interventions. The follow-up periods varied across domains so that comparisons among outcomes were not appropriate, but analyses of changes within domains indicated that no significant loss of effect occurred from post to follow-up. The mean effect for sociometric outcomes increased substantially from 0.15 at post to 0.43 at follow-up, but the latter effect was based on only three studies. In general, the data from Table V suggest that interventions produced significant improvements in multiple domains of adjustment and these gains did not diminish over time.

Table VI. Binomial Effect Size Display of Success Rates for Different Prevention Programs

Type of program	Success rates[a]	
	Intervention	Controls
Environment-centered		
School-based	58.5	41.5
Parent training	54	46
Transition programs		
Divorce	59	41
School entry/change	60	40
First-time mothers	72	28
Medical/dental procedure	61.5	38.5
Person-centered programs		
Affective education		
Children 2–7	67.5	32.5
Children 7–11	56	44
Children over 11	58.5	41.5
Interpersonal problem solving		
Children 2–7	73	27
Children 7–11	59	41
Children ver 11	—	—
Other person-centered programs		
Behavioral	62.5	37.5
Nonbehavioral	56.5	43.5

[a] Success rates are in percentages; if the intervention had no effect, rates would be 50% for both groups.

Practical Significance of Outcomes

The magnitude of an ES does not necessarily reflect its practical or social significance. One way to assess the practical significance of an intervention is to indicate how outcomes for the experimental and control groups overlap. Tables are available that convert mean effects to percentiles that reflect how the average participant in an intervention fares in comparison to those in the control condition (Lipsey, 1990, Table 3.6). Current data indicate that across different types of interventions, the outcomes for the average participant in a primary prevention program surpasses 59–82% of those in the control group.

Another method of depicting the practical significance of interventions on participants at a single time point is through Rosenthal and Rubin's (1982) binomial effect size display (BESD). The BESD reflects the change in the success rate resulting from an intervention. In other words, thinking of program outcomes in dichotomous terms, what are the comparable success rate of the intervention and control groups? These data are presented in Table VI for different program categories.

If a program has no effect, the success rates for intervention and control groups would both equal 50%. Expressed in BESD terms, effects for primary prevention generally reflect practical benefits. There was an 8–46% differential success rate favoring prevention groups. A 35% or higher differential success rate occurred for three program categories (transition programs for first-time mothers and affective education and problem-solving training for children 2–7). Furthermore, there was a 17–25% difference favoring prevention for seven additional program categories.

DISCUSSION

Findings from 177 outcome evaluations indicate that most types of primary prevention programs achieve significant positive effects (mean ESs ranged from 0.24 to 0.93). Furthermore, most interventions significantly reduced problems and significantly increased competencies, and affected functioning in multiple adjustment domains. For example, outcomes reflected both a decrease in subclinical levels of internalizing and externalizing problems and improved academic performance (mean ESs from 0.30 to 0.32), and these gains were maintained in those studies collecting follow-up data. These outcomes are impressive since participants in primary prevention programs are functioning in the normal range to begin with and thus should not be expected to change dramatically. Finally, analyses indicate that primary prevention programs achieve results that possess practical as well as statistical significance. The average participant in a primary prevention program surpasses the performance of 59–82% of those in a control group.

Current findings for primary prevention compare very favorably to the impact of many other interventions. Lipsey and Wilson (1993) reported that the overall mean from 156 meta-analyses assessing the outcomes of a wide range of psychological, educational, and behavioral treatments was 0.47 (SD = 0.28). Findings for most primary prevention programs are within 1 standard deviation of this grand mean. The majority of mean effects for many successful medical treatments such as bypass surgery for coronary heart disease, chemotherapy to treat certain cancers, and various drug treatments, also fall below 0.50 (Lipsey & Wilson, 1993).

In terms of other preventive interventions, the most successful programs to prevent smoking and alcohol use in school children have obtained mean ESs between 0.29 and 0.36 (Bruvold, 1993; Tobler, 1992) and delinquency prevention usually produces mean effects of a similar magnitude (Gensheimer, Mayer, Gottschalk, & Davidson, 1986; Lipsey, 1992). Finally, Rosenthal (1991) has pointed out that some well-established preventive treatments in medicine such as the use of aspirin to prevent heart attacks have had effect sizes as low as 0.07. In summary, the results for many types of primary prevention mental health programs for children and adolescents are similar to or higher in magnitude than those achieved by many other treatment and preventive interventions in the social sciences and medicine. Current data confirm the merit of primary prevention as a strategy to achieve change in normal populations.

Current findings also have implications regarding conceptualizations of primary prevention programs. There was empirical support for a model of primary prevention that categorized programs according to level of intervention (person- vs. environment-centered), types of transitions encountered (divorce, school entry, etc.), and whether mental health promotion was the major orientation. In most cases, programs that shared these features produced similar and significant results. Findings thus support the importance of maintaining conceptual distinctions regarding primary prevention interventions (Coie et al., 1993; Cowen, 1986; Price, 1986). At the same time, current findings are complex. In some cases, the change strategies employed and the cognitive developmental level of program participants also contributed to outcomes, reflecting that multiple variables are important to consider when attempting to understand program outcomes.

In other words, as Lorion (1990) has noted, preventionists must avoid the uniformity myth that has plagued psychotherapy research. Primary prevention is not a single uniform strategy that achieves uniform results, but a collection of distinct approaches that are likely to vary in outcome depending on the level of intervention, target population, program objectives, and specific circumstances of the intervention. It is important to maintain such distinctions whenever possible and investigate the factors that contribute to program outcomes in each case.

Finally, it is encouraging that there does not appear to be a very high likelihood of negative effects from primary prevention programs; only 9 of 177 programs yielded negative effects and most of these were negligible in magnitude. At the same time, analyses were limited to the quantitative outcome data reported by researchers. It is possible, as it is for any intervention, that some unintended and perhaps subtle negative consequences occurred. Preventionists should continue to monitor interventions to detect any possible negative side effects. The following sections discuss ways that future research can be improved in three areas: general design features, assessing outcomes, and miscellaneous issues.

Future Research Directions

General Design Features

There are both positive and negative features in the methodological characteristics of current programs. On the positive side, a majority of studies were true randomized experiments (61%), had little sample attrition (10% or less in 80% of the studies), and used multiple outcome measures (90%). On the negative side, more studies need to collect follow-up information over longer periods. Only 25% of studies collected any follow-up data, and the follow-up period was rarely 1 year or longer. Overall, current follow-up data do not permit any firm conclusions about the long-term impact of most interventions.

A few investigators are beginning to replicate their earlier findings (e.g., Felner et al., 1993; Jason et al., 1992; O'Donnell, Hawkins, Catalano, Abbott, & Day, 1995), which increases confidence in the efficacy of certain interventions. More attempts to replicate specific programs and examine their external validity across different populations and settings are needed.

Moreover, it is important to note how current study characteristics limited the types of analyses that could be done. For instance, we could not examine our initial 3×2 model of primary prevention completely because of insufficient numbers of studies in certain cells. As data on primary prevention accumulate, it will be possible to assess various conceptual approaches to intervention in more depth and detail than could be accomplished in the current review.

It was also not possible to examine how program implementation influenced outcomes since very few investigations provided any relevant data. Findings from school-based prevention programs in substance use and physical health promotion have indicated that the quality of implementation significantly affects outcomes (Durlak, 1995). Since it is reasonable to believe the same finding would occur for the prevention of behavioral and social problems, future researchers should document the quality of implementation and its relationship to outcomes.

We also had to use age as a proxy variable for developmental level since researchers did not directly assess children's social-cognitive skills. Since children's presumed cognitive developmental level influenced outcomes for certain interventions, namely, affective education and problem-solving programs, current findings support the general theory that children's developmental level should relate to program outcomes (Holmbeck & Kendall, 1991; Kazdin, 1990; Roberts, 1986).

Although it is possible that some other variable related to age aside from cognitive developmental level is important, future research should systematically assess participants' developmental competencies and relate them to outcome. There are several social-cognitive skills that are potentially relevant such as role-taking skills, interpersonal understanding, causal reasoning, and various cognitive mediational processes (Cohen & Schleser, 1983; Forehand & Wierson, 1993; Holmbeck & Kendall, 1991).

Current research can be also improved by establishing specific program goals, clearly operationalizing intervention procedures, and by using theory to guide the intervention. Similar recommendations have been made by others (Heller et al., 1980; Jason, Thompson, & Rose, 1986; Price, Cowen, Lorion, & Ramos-Mckay, 1989). Conclusions about the factors that lead to change in primary prevention are premature since details are lacking on many features of interventions. For example, in many reports (64%) program goals were described in vague or general terms, such as improving school adjustment, which does not permit precise assessment of the preventive impact of interventions. Furthermore, most current interventions are not standardized and many programs have multiple components whose relative contribution to outcomes are unknown. Future investigators should operationalize their interventions carefully, collect process data, and compare programs containing different components in order to gain an understanding of the mechanisms of change operating in different programs.

The value of theory-driven research cannot be overestimated. Good theories provide a coherent model for intervention and analysis by specifying the target population, suggesting the components that should compose the intervention, and predicting change. For example, based on an empirical review of the literature, Wolchik et al. (1993) identified five potential mediators of children's adjustment to divorce. They then designed an intervention to influence these mediators and found that changes on one of the five hypothesized mediators (quality of the mother–child relationship) was most strongly related to outcomes. Studies such as those by Wolchik et al. (1993) that evaluate theoretically important variables can make important contributions to prevention research.

Assessing Outcomes

Two characteristics of outcome measures were associated with lower effect sizes: (a) use of multiple outcome measures; and, (b) use of at least one normed measure. In the former case, multiple measures were frequently used to sample different domains of children's functioning. Although lower effects may be obtained, investigators should continue to assess how prevention modifies different aspects of adjustment, and use the most reliable and valid measures to do so.

In addition to the careful choice of outcome measures, future studies need to determine how different program participants benefit from intervention, since it is unlikely that all those in the target population demonstrate the same amount of change. Discovering how various program and participant characteristics relate to different outcomes would be very useful in improving the efficiency and impact of the next generation of research.

The fact that most types of programs significantly reduced problems and significantly increased competencies carries the possible implication that interventions were simultaneously reducing risk and increasing protection for target populations. Before this interpretation can be accepted, however, it is necessary to monitor the adjustment of target groups over time. Risk and protective factors refer to the future probability of negative or positive outcomes. Therefore, it is important to collect follow-up data to determine which immediate outcomes are associated with longer-term adjustment.

Miscellaneous Issues

Current findings suggest that the Institute of Medicine's (1994) decision to exclude health promotion as a preventive intervention is premature. Health promotion appears to have value as a preventive intervention, although more data are needed. For example, affective education which promotes children's emotional and social development was particularly effective in both increasing competencies and reducing problems for children 2–7 years old (mean ESs = 0.85 and 0.69, respectively). Except for problem-solving training, however, there were insufficient numbers of studies to assess the impact of other types of mental health promotion strategies, such as assertiveness training.

Interventions relying on interpersonal problem-solving training did not significantly reduce maladjustment although they did increase competencies, mainly in the context of improving problem-solving skills. The former outcome is disappointing because problem-solving training has many advocates. The inability to assess program implementation, which is believed critical to the success of problem-solving training programs (Weissberg & Gesten, 1982), may be responsible for this finding. Problem-solving training has been used in some successful multidimensional programs, although its specific contribution to outcome was unclear (e.g., Hawkins et al., 1991). Perhaps problem-solving training is not as effective by itself as it is when combined with other program elements. Proponents of problem-solving training must document how the use of such interventions reduces problems in normal populations.

It is possible to speculate on why parent training was the only type of intervention that did not achieve significant positive mean effects (0.16). These programs focused primarily on improving parents' child-rearing skills. An inability to reach those parents who could benefit may be responsible for the ineffectiveness of these parent programs. For example, it has been difficult to recruit parents to participate in programs offered through the schools or in the community. Only 55 of 1,500 eligible parents participated in the program evaluated by Frazier and Matthes (1975). Although the parent training effort described by Strayhorn and Weidman (1989) yielded significant outcomes, only 30% of the parents successfully completed all the required program activities.

In contrast, other types of programs involving parents have been more successful. For example, transition programs targeting first-time mothers are among the most effective of all interventions (mean ES = 0.87). These programs seem to capitalize on the need for reassurance and support upon the birth of a first child and offer mothers both social support and child-rearing assistance. Parents have also successfully participated in early childhood interventions which combine a variety of support services for parents with preschool or child development programs (mean ES = 0.35). That is, parent services are offered in tandem with services for children. In other words, it is possible that the timing of the intervention interacts with other features of parent involvement such as the co-occurrence of services for children and the provision of social support to yield positive outcomes. The importance of parents on children's lives cannot be denied. Therefore, current data on the impact of parent training programs should not dissuade future researchers from assessing how to involve parents most effectively in prevention programs.

The clinical implications of current findings should be noted. Surveys indicate that no more than a third of clinically distressed children and adolescents ever receive any mental health treatment (Kazdin, 1990). Therefore, successful primary prevention efforts could play an important role in reducing the need for future treatment and preventing unnecessary suffering and maladjustment in many young people who will otherwise never receive any formal mental health care. The implication is that mental health staff should learn how to offer effective preventive services.

In summary, although several issues have to be resolved, outcome data indicate that most categories of primary prevention programs for children and adolescents produce significant effects. These findings provide empirical support for further research and practice in primary prevention.

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