

INTERVENTION WITH HIGH-RISK ALCOHOL AND DRUG-ABUSING MOTHERS: II. THREE-YEAR FINDINGS FROM THE SEATTLE MODEL OF PARAPROFESSIONAL ADVOCACY

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We examine the efficacy of a paraprofessional advocacy program for improving health and social outcomes of high-risk substance-abusing mothers and their children. This intervention included 3 years of home visitation, advocacy, and connection with appropriate community services. To assess the overall effectiveness of the model, clients were compared to concurrently enrolled controls on a composite variable comprised of indicators of alcohol/drug treatment, abstinence, family planning, child well-being, and connection to services. Clients obtained higher scores, on average, than controls on the composite variable—as well as on every indicator. Clients who spent more time with advocates had more positive outcomes. Results suggest that this paraprofessional advocacy model can help protect the safety of the children of substance-abusing mothers, while helping mothers take the steps they need to take in order to make fundamental changes in their lives. © 1999 John Wiley & Sons, Inc.

Alcohol and drug abuse during pregnancy has been recognized as an important public health problem for more than 20 years (Gomby & Shiono, 1991; Jaffe, 1985; Smith, 1982), incurring tremendous social and economic costs (CASA, 1993; National Center on Addiction and Substance Abuse, 1996; Rice et al., 1991; Schragar et al., 1995). Phys-

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ical and developmental effects on children of maternal substance abuse during pregnancy have been well documented (Coles et al., 1992; Finnegan, 1976; IOM, 1996; Schenker et al., 1990; Streissguth, 1997; Zuckerman et al., 1989).

Far more limited is the investigation of prevention and intervention efforts with the alcohol and drug-dependent mothers delivering these children. Alcohol and drug-abusing women pose a challenge to professionals because their lives are often characterized not only by serious substance abuse, but also by poverty, violence, chaotic living conditions, and alienation from community health and social service providers (Finkelstein & Piedade, 1993; Haskett et al., 1992; Kaplan, 1986; Keith et al., 1988). Effects of substance abuse differ among women and men in terms of physiological and social consequences, and forms of psychological impairment (Gomberg, 1979; 1981; Roman, 1988; Schneider et al., 1995; Sullivan, 1994). Significant barriers exist to discourage and prevent high-risk women from obtaining treatment and healthcare services, including lack of childcare, lack of transportation, cultural insensitivity, and poor coordination of services (Chasnoff, 1991; Finkelstein, 1993; Hutchins & Alexander, 1990). In addition, for many women, alcohol and drug abuse occurs primarily in the home, with the result that substance abuse problems often go unrecognized or underestimated by professionals, even when the women do seek help (Reed, 1987; Robinson, 1984; Sullivan, 1994).

THE SEATTLE MODEL OF PARAPROFESSIONAL ADVOCACY

The Seattle Birth to 3 Program began in 1991 as a 5-year federally funded research demonstration project designed to test the efficacy of a model of intensive, long-term paraprofessional advocacy with extremely high-risk mothers who abuse alcohol or drugs heavily during pregnancy and are estranged from community service providers. Since 1996, the Washington State Legislature has appropriated funds for continuation of the program as the Parent–Child Assistance Program (P-CAP) and expansion to a second site. The model uses a case management approach, which is an effective complement to traditional substance abuse treatment (Sullivan et al., 1992), and focuses not simply on reducing alcohol and drug use, but on reducing other risk behaviors and addressing the health and social well-being of the mothers and their children (Marlatt, 1996). Paraprofessional advocates provide their services within a context of relational theory, which emphasizes the importance for women of positive interpersonal relationships within an intervention setting (Amaro & Hardy-Fanta, 1995; Finkelstein, 1993; also see companion paper, Grant et al., 1999, in this issue).

The Advocacy Intervention

Paraprofessional advocates each work with a caseload of 12 to 15 clients and their families, from the birth of the target child until the child is 3-years-old. Women are enrolled into the program at or near the time of delivery because many of these high-risk women never appear in prenatal clinics. Delivery is often the only time they come in contact with the health care system. Over the 3-year intervention period, advocates work to establish a trusting relationship with clients—a process that sometimes takes months with clients whose lifelong experiences have taught them not to trust anyone. Advocates have had personal experience with many of the same types of adverse life experiences as

clients, and act as positive roles models with an experienced and realistic perspective. They help motivate clients to make changes, assist clients identifying personal goals, assure that clients follow-up on referrals, and offer guidance and a watchful eye. The individualized programming possible within the advocacy framework is an essential component permitting each mother to work toward goals that are realistic and appropriate for her.

The model does not provide direct alcohol or drug treatment or clinical services, but instead offers consistent home visitation and links women and their families with a comprehensive array of existing community resources. Advocates visit client homes weekly for the first 6 weeks, then biweekly or more frequently, depending on client needs; they transport clients and their children to important appointments, link clients with appropriate service providers, and work actively within the context of the extended family. Clients are not required to obtain alcohol/drug treatment in order to participate, and are never asked to leave the program because of relapse or setbacks. Advocates trace clients who are missing, stay in contact with the client's family members, and provide advocacy services for the target child regardless of who has custody of the child (Grant et al., 1996a,b, 1997a). A companion paper (Grant et al., 1999) in this issue describes the theoretical framework of the model and key administrative elements of this paraprofessional advocacy program.

The Seattle model of paraprofessional advocacy is based on an understanding that the most effective intervention programs for high-risk pregnant and parenting women are holistic, take into account the complex, multidimensional nature of the women's problems, and provide services that are multidisciplinary, comprehensive, coordinated, and include the children (Brotman et al., 1985; Chavkin & Paone, 1991; Finkelstein, 1993; Finnegan, 1988; Hutchins & Alexander, 1990; Ianneralla et al., 1986; Ramey & Ramey, 1993; Weiss, 1993). Program evaluation should therefore examine multidimensional outcomes, improved overall social functioning, and reduction of risk to the mother, the children, and the community, rather than focus solely on the traditional treatment goal of complete abstinence (Babor et al., 1988; Curry, 1991; Moos et al., 1990; Schneider et al., 1995).

Implementation of this model reflects these central points. Specific program goals include: 1) assist mothers in obtaining treatment, maintaining recovery, and resolving the myriad problems associated with their substance abuse; 2) guarantee that the children are in a safe environment and receiving appropriate health care; 3) effectively link families with community resources; 4) demonstrate successful strategies for working with this population in order to prevent the risk of future drug- and alcohol-affected children.

Advocates work within the context of the close interpersonal relationships they develop with clients in order to guide them in examining their problems, developing their goals, and defining and taking steps necessary to achieve them. Client goals are more easily achieved because advocates take an active role in identifying and reducing community service barriers and improving linkages among supportive community services. Accordingly, program evaluation was conducted with specific attention to those life domains that could be expected to be influenced by the intervention, including alcohol/drug treatment, abstinence from alcohol/drugs, family planning, health and well-being of the target child, and appropriate linkages with service providers such as mental health counseling, healthcare services, education and vocational training, parenting classes, and childcare.

This article presents findings from the 36-month evaluation of the Seattle model of paraprofessional advocacy based on each mother's 3-year relationship with the initial Birth to 3 Program. Three questions are addressed in the analyses:

- Did the model produce improved outcome for clients compared to controls?
- Did community-referred clients differ from hospital-recruited clients in demographic characteristics and 3-year outcomes?
- Could factors be identified that relate to improved outcome among clients?

METHODS

Sample

Subjects were recruited from July 1991 through December 1992 by hospital recruitment, and, beginning in September 1991, also by community referral—as the community became aware of the Seattle Birth to 3 Program. By design, the program sought the highest-risk alcohol and drug-abusing women delivering in the Seattle area. Eligibility criteria included singleton birth, little or no effective involvement with social or health services during pregnancy (including inadequate prenatal care), and heavy use of alcohol or illicit drugs during the target pregnancy. "Heavy use" was defined to include drinking in a binge pattern (five or more drinks per occasion) once-a-month or more, and/or use of any illicit substance an average of once-a-week or more during pregnancy. Degree of involvement with community services was determined by discussion with the woman or referral source.

Hospital recruitment. Hospitalized postpartum women delivering at two urban Seattle hospitals were asked by a program research assistant to complete a confidential one-page screening questionnaire (Streissguth et al., 1991) eliciting demographic information and information about alcohol and drug use during pregnancy and in the month prior to becoming pregnant. After completing the screening questionnaire, patients who met eligibility criteria were initially assigned at random to either client or control group (every third eligible woman assigned to the control group) to obtain a two-to-one ratio of clients to controls. Due to the particular demographics of the community referrals, the assignment of hospital recruits was adjusted sequentially in order to approximately balance the control group and the composite client group (hospital-recruited and community-referred) in terms of race, age, educational level, and type of drug use.

After assignment and agreement to participate, the research assistant administered a more detailed postpartum interview to hospital-enrolled clients and controls in the hospital prior to discharge. Prior to the interview, women enrolled as controls were informed that the purpose of the study was to determine factors related to healthy pregnancy and child development, and that they would be interviewed again in 3 years. Women enrolled as clients were told about the Birth to 3 intervention program and assigned to an advocate who contacted them within the week.

Community referral. Referrals of high-risk substance-abusing women were also accepted from local health, social, and welfare agencies if they were within 1 month pre- or postpartum. Referred women were contacted by the program director, completed the intake

screening questionnaire, and, if eligible, were asked to participate and interviewed within 1 week after delivery or postpartum enrollment. Community-referred clients received the same advocacy services as hospital-recruited clients. Referred clients were not assigned to the control group because we considered their enrollment to be a service in response to community need. We evaluated their progress in comparison to the hospital-recruited clients. Fifty-four percent of clients ($n = 35$) were enrolled through community referral.

All controls ($n = 31$) and 46% of clients ($n = 30$) were enrolled through hospital recruitment. Women in the control group were contacted every 6 months by telephone or letter in order to trace them for follow-up, but received no advocacy intervention services from this program. However, they may have participated in other community services or interventions between enrollment and their 36-month follow-up visit.

Human Subjects approvals were obtained from participating hospitals and informed consent was obtained from all subjects. A certificate of confidentiality was obtained from the federal government to further protect the privacy of the subjects. No clients were mandated by court order to participate, but 15 women participated in Birth to 3 under contract condition with Children's Protective Services (CPS) with the understanding that if they did not agree to work with an advocate, their infants would be placed directly into foster care after delivery.

A total of 2,244 postpartum women, including referrals, completed the screening questionnaire; and of these, 131 fit eligibility criteria. Twenty-eight of these were not asked to participate because of living out of the area, twin birth, or neonatal demise. Of the 103 women asked to participate, 65 were enrolled as clients (30 through hospital recruitment and 35 through community referral), 31 were enrolled as controls, and 7 refused enrollment.

Research Protocol

The 50-min structured postpartum interview, adapted from instruments used by the authors in prior studies (Grant et al., 1994; Streissguth et al., 1981, 1993), included items on demographics, quantity, frequency, and pattern of alcohol and drug use prior to and during pregnancy, problems associated with alcohol and drug use, family history of substance abuse problems, and use of community services during pregnancy. Specialized interview techniques were used to increase the accuracy of self-report, including calendars and reminders of special events.

Clients and target children were evaluated at follow-up visits at 4, 12, 24, and 36 months. Controls and their children were evaluated at 36 months by interviewers who were blind with respect to subject status and source of recruitment (whether hospital recruited or community referred). All follow-up visits took place at a University of Washington research facility. Using a structured interview instrument, mothers were interviewed regarding substance abuse, changes in life circumstances, maternal and child health, and use of community services. If children were not in their mothers' custody, caretakers were interviewed regarding child health and services received. The Bayley Scales of Infant Development (Bayley, 1969, 1993) were administered to client children at each yearly visit and to control children at 36 months. The Shipley-Hartford Intelligence Scale (Shaw, 1966) was administered to clients at the 4-month visit, but not to the control group.

To provide a measure of confidence in the accuracy of client self-report, we administered the interview once to clients, and then again to their advocates at the 4-month follow-up interview. Over 95% of advocate responses were concordant with client responses. Data presented here are based on client self-report.

Client level of involvement with the advocacy intervention over the 3-year period was documented in two ways. The Client Contact Log (Ernst, 1997) was completed by the advocate after every contact to record the amount of time spent with each client. The Progress Toward Goals form was completed by the advocate at 4-month intervals and documented the client's self-identified goals and her progress towards achieving them (Grant et al., 1997a)—as well as whether the client was active or "missing" during that 4-month goal period.

ANALYSES

To measure overall effectiveness of the program, two holistic composite variables were created: a Baseline Assessment Score to assess the woman's status at intake, and an Endpoint Assessment Score to assess the woman's status at 36 months. Each of the two composite variables incorporates five domains in the client's life theorized a priori to be most affected by the advocacy intervention:

1. Utilization of alcohol/drug treatment;
2. Abstinence from alcohol and drugs;
3. Family planning (use of birth control, subsequent pregnancies);
4. Health and well-being of target child (health care, custody); and
5. Appropriate connection with community services at 36 months.

Each domain is comprised of items on which a subject was scored on a 5-point scale (most positive outcome +2, positive +1, neutral 0, negative -1, most negative -2). Item scores were summed to compute domain scores and domain scores summed to compute the total summary score. Domains were assessed by somewhat different items at Baseline and Endpoint (Table 1). Cronbach's alpha (computed from the five component domain scores) was .91 for the Baseline Score and .82 for the Endpoint Score, suggesting good item-to-scale reliability.

The Endpoint is a composite score that reflects both the client's status at 36 months and positive steps made during the previous 3 years regardless of the woman's current status. It also takes into account child outcomes affected by the advocacy intervention regardless of how well the mother is doing. For example, a woman drinking heavily at 36 months could still have a relatively high score on the Endpoint if during the 3 years she had chosen a tubal ligation, and the target child was not in her custody but was receiving good care; or if during the 3 years she had completed inpatient alcohol/drug treatment, achieved a period of abstinence of at least 6 months, and had chosen Norplant as a long-term birth control method, but had a relapse at 36 months.

Although community-referred clients are included as a third comparison group, our primary analysis focused on group differences between hospital-recruited clients and hospital-recruited controls tested by *t*-test and analysis of covariance of the Endpoint Score adjusting for the Baseline Score. Data on group differences by domain are presented and tested globally for an intervention effect on the Endpoint Score by a permutation test procedure (Good, 1994).

Table 1. Items Within Domains of the Composite Variables*At enrollment: The baseline assessment variable*

- I. Alcohol/drug treatment prior to enrollment
 - Previous inpatient or outpatient alcohol/drug treatment ever in life
 - Any inpatient or outpatient treatment during pregnancy
 - Other alcohol/drug follow-up service during pregnancy
- II. Abstinence from alcohol/drugs during target pregnancy
 - Abstinent throughout pregnancy
 - Abstinent during first trimester
 - Abstinent during second/third trimester
- III. Family planning
 - Usual pattern of birth control use before conception
 - Type of birth control method used
 - Target pregnancy planned
- IV. Health & well-being of target child
 - Adequacy of prenatal care
 - Gestational age (full-term, preterm, or premature)
 - Mother's ability to care for target child as assessed by custody of previous biological child(ren)
- V. Family connection with services during pregnancy
 - Regular family healthcare provider
 - Mental health counseling
 - Other healthcare services
 - Childbirth/parenting classes
 - School/vocational training for mother
 - Basic needs for the family (clothing/food/supplies)

36-month evaluation: The endpoint assessment variable

- I. Alcohol/drug treatment
 - Any type alcohol/drug treatment since enrollment (birth–36 months)
 - Inpatient alcohol/drug treatment (birth–36 months)
 - Outpatient alcohol/drug treatment (birth–36 months)
 - Other alcohol/drug follow-up treatment services (birth–36 months)
- II. Abstinence from alcohol/drugs
 - Abstinent at 36 months
 - Period of short-term abstinence (≥ 6 months) since enrollment (birth–36 months)
 - Period of long-term abstinence (≥ 1 year) since enrollment (birth–36 months)
- III. Family planning
 - Usual pattern of birth control use at 36 months
 - Type of birth control method used at 36 months
 - Subsequent pregnancies
 - Action taken regarding subsequent pregnancy (e.g., termination, alcohol/drug treatment, etc.)
- IV. Health and well-being of target child
 - Has a regular doctor
 - Well-child healthcare visits
 - Immunizations
 - Custody of target child in relation to mother's alcohol/drug use
- V. Family connection with services at 36 months
 - Regular family healthcare provider
 - Other healthcare services (physical therapist, eye doctor, dentist)
 - Mental health counseling
 - Assessment for alcohol/drug treatment
 - Parenting classes
 - Childcare/daycare (for all children)
 - Basic needs (food, clothing, supplies)
 - Further education and vocational training for mothers

RESULTS

Demographic and historical characteristics for controls and both client groups at enrollment and at the 36-month follow-up are shown in Table 2. There are no significant differences between hospital-recruited clients and controls on these dimensions. Community-referred clients differed significantly from hospital-recruited clients on race, with a higher proportion of African Americans and a lower proportion of Native Americans, Asians, and Hispanics.

The maternal follow-up rate at 36 months was 92% for clients and 83% for living controls. One control mother was known to have been murdered; the other controls and clients not seen were lost to follow-up. The follow-up rate at 36 months for living children was 92% for clients and 87% for controls. One client infant died of Sudden Infant Death Syndrome (SIDS) at 4 months, and another of positional asphyxia in a defective crib at 9 months. One control infant died of SIDS at 6 weeks. The 10 clients and controls lost to follow-up did not differ from subjects seen at 36 months on race or type of drug use during pregnancy, although on average they began cocaine and heroin use 2 to 3 years earlier, were 3 years younger, and had almost a year less education. Of the five clients lost to follow-up, two were hospital recruited and three were community referred.

Summary statistics for the Baseline and Endpoint Scores, and a breakdown of the five domains of the Endpoint Score are presented in Table 3. The control group had a somewhat more positive baseline score than either the hospital-recruited or the community-referred client groups at enrollment, although differences were not statistically significant. Comparison of hospital-recruited clients (HRC) and controls after 3 years shows that client scores were significantly higher on the summary Endpoint Score measuring overall improvement in multiple domains of the subjects' lives (mean HRC score = 17.1 vs. mean control score = 10.1, $t = -2.11$, $p \approx .04$). Community-referred clients (CRC) also scored higher than controls on this composite Endpoint Score (mean CRC score = 16.8 vs. mean control score = 10.1, $t = -1.78$, $p \approx .08$). Analysis of covariance adjusting for the Baseline Score (Baseline mean: Control = -18.5; HRC = -21.8; CRC = -19.8) suggests a more significant result, $p \approx .02$, for comparison of the HRC client group with the control group. The 3-group analysis of covariance is also significant ($p \approx .05$).

Outcomes for each client group and for clients as a whole were more positive than outcomes for controls on each of the five domains (Table 3). Clients also scored in the positive range over more domains than controls: 36 clients (60%), including 10 of the 15 clients who had been enrolled under a CPS contract condition, scored in the positive range on at least four of the five domains, compared to only eight (32%) controls ($p < .05$). While none of the domain comparisons is individually statistically significant, the overall pattern is significant according to the Endpoint Score (noted above), and also according to permutation tests. Randomly permuting the three group labels 1,000 times and recalculating the means as in Table 3, we find that the probability of all 10 group differences (HRC vs. Control and CRC vs. Control) being in this expected direction is .018. That is, this pattern of group differences is significant at the .018 level. The same test considering only the hospital-recruited groups results in a .076 p -value for the pattern of five domain differences.

Outcomes by Domain and Level of Involvement

Clients varied in their level of participation with the program over time, depending on their life circumstances and their acceptance of the advocate. Twenty-five of the 65

Table 2. Demographic and Historical Characteristics of Birth to 3 Clients and Controls

	Hospital-recruited						Community-referred					
	Full client group			Controls			Clients			Clients		
	enrollment (n = 65) ^a mean or # (%)	36 months (n = 60) mean or # (%)	enrollment (n = 31) mean or # (%)	36 months (n = 25) mean or # (%)	enrollment (n = 30) mean or # (%)	36 months (n = 28) mean or # (%)	enrollment (n = 35) mean or # (%)	36 months (n = 32) mean or # (%)				
Age at enrollment, mean years	27.4	27.6	27.8	28.5	27.5	27.6	27.3	27.5				
Education, mean years	11.4	11.5	11.5	11.4	11.6	11.7	11.3	11.3				
No high school diploma/GED	34 (52)	29 (48)	9 (29)	7 (28)	12 (40)	10 (36)	22 (36)	19 (59)				
Race:												
African American	31 (48)	27 (45)	11 (36)	10 (40)	9 (30)	7 (25)	22 (63)	20 (63)				
White	19 (29)	18 (30)	13 (42)	9 (36)	10 (33)	10 (36)	9 (26)	8 (25)				
Native American	10 (15)	10 (17)	5 (16)	5 (20)	7 (23)	7 (25)	3 (9)	3 (9)				
Other (Hispanic, Asian)	5 (8)	5 (8)	2 (6)	1 (4)	4 (13)	4 (14)	1 (3)	1 (3)				
Single, separated/divorced	50 (77)	46 (77)	22 (71)	19 (76)	22 (73)	20 (71)	28 (80)	26 (81)				
Multiparous	53 (82)	50 (83)	25 (81)	21 (84)	22 (73)	21 (75)	31 (89)	29 (91)				
Children:												
Total, mean ^b	3.1	3.1	2.8	2.8	2.9	3.0	3.2	3.2				
Living with mother, mean ^c	0.8	0.8	0.5	0.6	0.5	0.5	1.0	1.1				
Not with mother, mean ^c	1.3	1.3	1.2	1.2	1.5	1.5	1.2	1.1				
IQ score, mean ^d	83.5	83.8	—	—	86.9	87.9	81.3	81.1				
At enrollment:												
Source of income: public assistance	54 (83)	50 (83)	28 (90)	22 (88)	25 (83)	23 (82)	29 (83)	27 (84)				
Housing: transitional or homeless	36 (55)	32 (53)	13 (43)	10 (40)	19 (63)	17 (61)	17 (49)	15 (47)				
Ever jailed	47 (80)	45 (79)	17 (77)	17 (77)	22 (81)	22 (81)	25 (78)	23 (77)				
Childhood history:												
One/both parents abused alc/drugs	41 (76)	40 (75)	19 (79)	19 (79)	20 (74)	129 (73)	21 (78)	21 (78)				
Reported sexual/physical abuse as a child	40 (65)	39 (65)	14 (56)	14 (56)	19 (66)	18 (64)	21 (64)	21 (66)				
Lived in foster home at some time	36 (58)	34 (57)	10 (40)	10 (40)	16 (55)	15 (54)	20 (61)	19 (59)				

Table 2. Continued

	<i>Hospital-recruited</i>						<i>Community-referred</i>		
	<i>Full client group</i>			<i>Controls</i>			<i>Clients</i>		
	<i>enrollment</i> (<i>n</i> = 65) ^a <i>mean or</i> <i># (%)</i>	<i>36 months</i> (<i>n</i> = 60) <i>mean or</i> <i># (%)</i>	<i>enrollment</i> (<i>n</i> = 31) <i>mean or</i> <i># (%)</i>	<i>36 months</i> (<i>n</i> = 25) <i>mean or</i> <i># (%)</i>	<i>enrollment</i> (<i>n</i> = 30) <i>mean or</i> <i># (%)</i>	<i>36 months</i> (<i>n</i> = 28) <i>mean or</i> <i># (%)</i>	<i>enrollment</i> (<i>n</i> = 35) <i>mean or</i> <i># (%)</i>	<i>36 months</i> (<i>n</i> = 32) <i>mean or</i> <i># (%)</i>	<i>36 months</i> (<i>n</i> = 32) <i>mean or</i> <i># (%)</i>
Ran away from home	37 (60)	36 (60)	14 (56)	14 (56)	19 (66)	18 (64)	18 (55)	18 (56)	
Quit high school	48 (77)	46 (77)	15 (60)	15 (60)	21 (72)	20 (71)	27 (82)	26 (81)	
Target pregnancy:									
Inadequate prenatal care ^c	52 (80)	48 (80)	22 (71)	18 (72)	22 (73)	21 (75)	30 (86)	27 (84)	
Number of prenatal visits, mean	4.7	4.9	5.8	6.1	5.2	5.2	4.3	4.5	
Substances used during pregnancy:									
Alcohol	51 (79)	47 (78)	23 (74)	20 (80)	24 (80)	22 (79)	27 (77)	25 (78)	
Binge alcohol	25 (39)	23 (38)	11 (36)	10 (40)	10 (33)	9 (32)	15 (43)	14 (44)	
Cocaine	58 (89)	53 (88)	27 (87)	21 (84)	26 (87)	24 (86)	32 (91)	29 (91)	
Marijuana	31 (48)	28 (47)	16 (52)	12 (48)	15 (50)	13 (46)	16 (46)	15 (47)	
Heroin	14 (22)	13 (22)	11 (36)	10 (40)	9 (30)	9 (32)	5 (14)	4 (13)	
Other illicit drugs	8 (12)	8 (13)	8 (26)	7 (28)	5 (17)	5 (18)	3 (9)	3 (9)	
Cigarettes	60 (92)	56 (93)	26 (84)	22 (88)	28 (93)	26 (93)	32 (91)	30 (94)	
Baby's father also used alcohol/drugs	31 (53)	29 (53)	15 (56)	12 (55)	15 (56)	14 (56)	16 (50)	15 (50)	

^aDenominators vary: full client group, enrollment: 54-65, 36 months: 57-60; control group, enrollment: 22-31, 36 months: 22-25; hospital-recruited client group, enrollment: 27-30; 36 months: 26-28; community-referred client group, enrollment: 27-35, 36 months: 27-32.

^bTotal includes target child.

^cNumber of biologic children with and not with mother at enrollment does not include target child, whose custody was often undetermined at that time.

^dIQ score not available on control group and some clients. Score was available for 18 hospital recruited and 27 community referred clients, for a total of 45 clients.

^eInadequate as measured by the Adequacy of Prenatal Care Utilization Index (Kotelchuck, 1994).

Table 3. Means and Standard Deviations of Baseline and Endpoint Scores and Endpoint Domain Scores

	<i>Full client group (n = 60) mean (SD)</i>	<i>Hospital-recruited</i>		<i>Community- referred</i>
		<i>Controls (n = 25) mean (SD)</i>	<i>Clients (n = 28) mean (SD)</i>	<i>Clients (n = 32) mean (SD)</i>
Baseline Score	-20.7 (6.1)	-18.5 (7.4)	-21.8 (6.0)	-19.8 (6.1)
Endpoint Score	17.0 (13.2)	10.1 (13.2)	17.1 (11.1)	16.8 (15.0)
Endpoint Domain scores:				
Alcohol/drug treatment	1.5 (5.3)	-0.6 (5.9)	1.0 (4.9)	1.8 (5.7)
Abstinence	3.3 (3.8)	2.6 (4.2)	3.9 (3.2)	2.7 (4.2)
Family planning	3.3 (4.5)	2.1 (4.7)	2.3 (4.8)	4.1 (4.1)
Target child	5.5 (2.6)	4.1 (2.8)	6.1 (2.3)	5.0 (2.8)
Connection with services	3.4 (4.7)	1.9 (4.2)	3.8 (4.7)	3.1 (4.8)

clients (38%) were involved with advocates for at least 32 of the 36 program months. Thirty-three (51%) were more moderately involved, participating between 9 and 31 months. Seven clients (11%) were minimally involved, participating for 8 months or less. Only two of the minimally involved clients were lost to follow-up at 36 months.

The client group seen at 36 months ($n = 60$) was divided into quartiles according to min per week, on average, spent with an advocate over the 3-year intervention period: 29 mins or less, 30–54 mins, 55–94 mins, and 95 mins or more per week. For presentation purposes, the two midrange quartiles were combined. In general, outcomes were better among clients who spent more time with their advocates (Table 4).

Alcohol/drug treatment. Overall, 85% of clients completed some form of alcohol or drug treatment during the program, with 52% completing either inpatient or outpatient treatment. Clients with the highest level of involvement with their advocates were more than twice as likely to have completed inpatient treatment than those least involved (67% vs. 33%). Of the 28 (47%) clients and 8 (32%) controls who had no prior alcohol or drug treatment, 14 clients entered treatment during the 3-year intervention period, while none of the controls did. All 14 clients who entered for the first time completed treatment.

Abstinence from alcohol/drugs. Abstinence was defined as no use for a period of at least 6 months of illicit drugs and alcohol if any problems with alcohol were indicated. Problems with alcohol were indicated by any one of the following conditions: 1) a positive T-ACE score (Sokol et al., 1989); 2) self-report of any alcohol-related problems; e.g., being arrested, being hospitalized, losing custody of children; 3) any binge drinking (five or more drinks per occasion); or 4) any daily or nearly daily drinking of more than two drinks a day. Abstinence rates at 36 months were higher among clients most involved with advocacy compared to those least involved (53% vs. 27%) and compared to controls (24%). Sixty-seven percent of the most involved clients, compared to only 40% of the clients least involved and 32% of the control group, had had a period of abstinence of a year or more during the 3-year intervention.

Table 4. 36-Month Outcomes Stratified by Amount of Advocacy Received

	Full client group (<i>n</i> = 60) # (%)		Control group (<i>n</i> = 25) # (%)		Clients grouped by time spent with advocate ^a		
					Least	Mid-range	Most
					0–29 min/week (<i>n</i> = 15) # (%)	30–94 min/week (<i>n</i> = 30) # (%)	≥ 95 min/week (<i>n</i> = 15) # (%)
Alcohol/drug treatment							
Any form of treatment, including groups	51 (85)	19 (76)	13 (87)	24 (80)	14 (93)		
Inpatient or outpatient treatment ^b	31 (52)	11 (44)	5 (33)	15 (50)	11 (73)		
Inpatient treatment ^b	28 (47)	9 (36)	5 (33)	13 (43)	10 (67)		
Outpatient treatment ^b	21 (35)	7 (28)	4 (27)	10 (33)	7 (47)		
Groups, drug-free housing	27 (45)	9 (36)	9 (60)	9 (30)	9 (60)		
Abstinence from alcohol/drugs							
Abstinent at 36-months for ≥6 months	17 (28)	6 (24)	4 (27)	5 (17)	8 (53)		
Period of abstinence ≥1 year	22 (37)	8 (32)	6 (40)	6 (20)	10 (67)		
Family planning							
Regular birth control use	44 (73)	13 (52)	10 (67)	21 (70)	13 (87)		
Reliable method ^c	26 (43)	8 (32)	5 (33)	12 (40)	9 (60)		
Subsequent pregnancy	31 (52)	12 (48)	10 (67)	15 (50)	6 (40)		
Subsequent birth	17 (28)	5 (20)	8 (53)	6 (20)	3 (20)		
Health and well-being of target child							
Regular well-child visits	51/54 (94)	22/24 (92)	13/13 (100)	25/28 (89)	13/13 (100)		
>5 sets immunizations	52/54 (96)	22/24 (92)	12/13 (92)	27/28 (96)	13/13 (100)		
Target child with mom at							
36 months	28/54 (52)	16/24 (67)	4/13 (31)	12/28 (43)	12/13 (92)		
Appropriate custody ^d	37/54 (69)	7/24 (29)	9/13 (69)	19/28 (68)	9/13 (69)		

^aTime spent with advocate assessed as number of minutes of direct advocate contact with client per week over the 3-year period as documented by Client Contact Log.

^bDefined as treatment completed or in progress at 36 months.

^cReliable methods of birth control included Norplant implants, tubal ligation, consistent Depo Provera shots, and IUD.

^dAppropriate custody of target child in relation to mother's alcohol/drug use.

Family planning. By the end of the 3-year advocacy period, 73% of clients were using birth control regularly, and 43% had chosen a tubal ligation or a reliable method such as the Norplant implant, Depo Provera shots, or an IUD. Clients who were most involved with their advocates were the most likely to be using a reliable method on a regular basis (Table 4). The most involved clients were less likely to become pregnant during the 3 years compared to the least involved clients (40% vs. 67%), and were also less likely to have had a subsequent birth (20% vs. 53%).

Health and well-being of target child. Groups varied little with regard to children having a regular doctor, being seen for well-child visits, and receiving appropriate immunizations by 36 months. The most striking difference between client and control groups was seen in the custody status of the target child at 36 months. For analysis

purposes, “appropriate custody” was defined as either the child being in the custody of a mother who had been in recovery for at least 6 months, or the child not being in the custody of a mother who was unable to maintain abstinence. While 67% of control children were in the custody of their mothers at 36 months, compared to 52% of client children, only 29% of control children compared to 69% of client children were in an appropriate custody situation relative to their mother’s current use of alcohol/drugs.

In the analysis of data from the Bayley Scales administered at 36 months, children of both the client and control groups (all of whom experienced prenatal polydrug exposure) performed significantly below the norms on the standardized Mental and Motor Scales, and were not significantly different from each other (Kartin, 1997).

Connection to services. Connection to services was measured as a ratio of those with a satisfactory connection versus those indicating a need for that service. Both client groups were more satisfactorily connected with needed service providers than the control group at 36 months. Services utilized by clients were, in rank order: family healthcare provider, drug/alcohol treatment, food bank, family planning clinic, Children’s Protective Services, legal services, parenting classes, other healthcare services, daycare/childcare, public housing, emergency bill-paying assistance, public health nurses, vocational training classes, mental health, and domestic violence services.

Other Outcomes

Type of drug use. All clients and controls were polysubstance abusers; all but four used cocaine in addition to other drugs. Clients who abused alcohol (along with other drugs) had higher Endpoint Scores (mean 15.3 for clients vs. 6.2 for controls), and a higher percentage scored in the positive range on at least 4 of 5 Endpoint domains, compared to alcohol-abusing controls (53% vs. 17%). Likewise, clients who abused heroin (along with other drugs) had higher Endpoint Scores (mean 19.4 for clients vs. 14.0 for controls), and a higher percentage scored in the positive range on at least 4 of 5 Endpoint domains compared to heroin-abusing controls (72% vs. 40%). Heroin-using clients, as a group, spent the least amount of time with their advocates.

IQ. IQ scores, available on only 45 of 60 clients, ranged from 59 to 110, with an average of 83.8. IQ was not related to level of involvement with the program or degree of progress while involved in the program. Notably, 14 of the 28 women with IQ scores of 85 or less were able to achieve positive scores on at least 4 of the 5 Endpoint domains. In fact, two of these successful clients had IQ scores below 70.

DISCUSSION

Future alcohol- and drug-affected births can be prevented in two ways: 1) by motivating women of childbearing age to abstain from alcohol and drugs during pregnancy; and 2) by educating and encouraging substance-abusing women to use reliable birth control methods on a regular basis. The 36-month findings presented here demonstrate the Seattle model to be a promising approach in helping disenfranchised, high-risk women enter alcohol/drug treatment, use birth control regularly, and become more involved with health and social services for themselves and their children.

On every outcome domain, both client groups had higher scores on average than the control group, in spite of the control group having higher baseline scores at enrollment. This result is not likely due to chance. The follow-up rates for all groups were high; there was no differential loss to follow-up that might explain the results.

Furthermore, both client groups also showed a relationship of better outcome with more involvement with advocates. While this relationship cannot be claimed to be causal on the basis of this type of study, the follow-up rates were similar for both client groups, and both client groups overall spent a similar amount of time with advocates.

In general, clients who spent more time with their advocates, and therefore became more involved in the relationship aspect of the intervention, were more likely to enter treatment, remain abstinent, deliver fewer subsequent children, and retain custody of their children. However, some clients made very positive strides in their lives with only minimal levels of direct advocate contact. The amount of time a client spent with an advocate varied according to an individual woman's needs and characteristics, as well as on the other services available in the community and utilized by her. For example, of six clients who scored higher than the median on the Endpoint Score yet were in the quartile that spent the least amount of time with advocates, four were heroin users whose advocates connected them with existing community methadone maintenance programs offering outpatient treatment, support groups, childcare, and parenting classes. This demonstrates one of the major roles of advocates in linking formerly alienated and non-participatory clients with appropriate and available community services and support systems.

Though not analyzed for this paper, intervention processes other than quantity of time with advocate, such as content of visit, maternal psychological characteristics, and family context can also moderate program effects (Cole et al., 1998; Korfmacher et al., 1998; Olds & Korfmacher, 1998). We collected information on the topics discussed at each visit and on household configuration; however, the small sample size of the demonstration cohort makes meaningful interpretation of this data difficult. We are continuing to collect information on family context, as well as data on maternal psychological characteristics, at our replication sites.

When we examined how community service connections differed between more successful clients (those scoring above the mean on the endpoint summary score) and less successful clients (those scoring below the mean), the higher-scoring clients were more than twice as likely to have linked with alcohol/drug treatment, parenting classes, and vocational training classes, and were more than twice as likely to have been connected with Children's Protective Services during the first 2 years of the target child's life. Although both groups were poorly connected to services at entry into the study (averaging approximately 1.4 service linkages), at completion of the program clients with higher summary scores had a greater number of provider connections (6.2 vs. 4.4).

Although very involved clients were less likely than controls to have a subsequent pregnancy while involved with the program, we were surprised by the relatively high subsequent pregnancy and birth rates for the client group as a whole. We did find, however, that the subsequent pregnancy was often a propitious time for advocates to help clients address issues dealing with birth control, becoming abstinent, and maintaining abstinence. Of the 17 clients who had another birth during their 3 years in the program, 9 subsequently chose tubal ligation, Norplant implant, or Depo Provera shots to prevent further unplanned births. Three women were abstinent from drugs and alcohol at conception of the subsequent pregnancy and did not use during the pregnancy. Eight en-

tered substance abuse treatment during the pregnancy, and four quit on their own in the second trimester. Only 2 of the 17 clients made no effort to achieve or maintain abstinence during the subsequent pregnancy.

We did not detect important differences between the client and control groups in terms of child health care services received. In general, there has been a marked improvement in infant mortality and child death rates in Washington state, attributed to improvements in delivering medical care to high-risk and low-income babies. Washington state ranks ninth in the nation in how well it cares for its children, up from 22nd in the nation in 1991 (*The State of Washington's Children*, 1995).

We did, however, observe that the well-being of client children was enhanced by the presence of an advocate in terms of custody in relation to a mother's alcohol and drug use. The close proximity of advocates to their clients' lives means that they are in a unique position to identify grave parenting problems in high-risk families that would otherwise escape detection by health and social service providers, and to bring these to the attention of the appropriate authorities. While one goal of the intervention was to promote a healthy relationship between the mother and baby and keep the dyad together, another was child safety. Advocates instigated removal of children from homes considered unsafe.

This study occurred at a time when national and local interest in "crack babies" was at a peak, and Seattle was the site of several other programs for high-risk and substance-abusing mothers and their children. Almost a third of the control mothers became involved with other community interventions during the 3 years of the program: after enrollment in *Birth to 3*, one control mother received extensive advocacy services through a local AIDS project, and seven control mothers participated to varying degrees in another federal research project on alcohol/drug treatment effectiveness. Furthermore, there is some threat of diffusion, as clients and controls did know each other in the community and some clients were known to have talked with control group members about their experiences with their advocates.

Obviously, self-report has limitations and is subject to bias. A woman who abuses alcohol and drugs during pregnancy may be concerned that disclosure will affect custody of her children, or perhaps that disclosure of less socially desirable behaviors will affect perception of her as a good mother. We did note that some clients revealed more to the interviewer about alcohol and drug use and other behaviors the longer they were involved with the program. While we were able to obtain some measure of confidence in client responses by comparing to advocate observation, this was not possible with controls.

We did not find underreporting of alcohol/drug use at enrollment to be a factor in whether or not clients made progress in the program. Of the 10 women who initially admitted to only moderate alcohol/drug use, but were enrolled on the basis of a referral source report of more extensive use, 5 scored above the median on the Endpoint Score, approximately the same proportion as those who revealed more at the time of enrollment.

Clients varied in the extent of their needs and in their willingness to accept the assistance of an advocate. Advocate styles in working with clients also varied, although the approach to appropriate advocacy was clearly defined and closely supervised (see Grant et al., 1996b; and Grant et al., 1999, companion paper in this journal). An advocate effect on endpoint assessment scores could not be determined because of the small sample size, and because some clients had more than one advocate over the 3 years.

Some aspects of study design warrant further discussion. Sequential adjustment of the assignment scheme was necessary because of our interest in matching the demographic composition of the (hospital recruited) control group with the composite client group, including community referrals who were not randomized. Furthermore, the size of the control group was limited by funding restraints. Replication of this study with a larger sample size and a randomized design (not perturbed by an uncontrolled community referral group) could address further questions, such as which elements of the model are most responsible for changes and what length of intervention is optimal.

On the other hand, this asymmetrical study design had advantages, as it permitted comparison of two methods of recruitment. Women referred by the community differed significantly from all eligible women identified through hospital screening on race (more African Americans and fewer Native Americans, Asians, and Hispanics), on educational level (less likely to have a high school diploma or GED), and on heroin use (less likely to have used heroin during pregnancy). Yet the analyses revealed that clients recruited through both methods were helped by the intervention. For example, clients with alcohol problems (regardless of recruitment) experienced a greater degree of positive change compared to controls than did clients whose drug problems did not include alcohol. This outcome may reflect the philosophy of our program, which considers alcohol problems at least as important an intervention target as illicit drug use. We recommend both recruitment methods for other communities developing similar interventions in order to avoid missing those high-risk women who are willing to self-disclose alcohol and drug problems during pregnancy and who need help, but who may be less visible to the usual community referral sources.

The idea to enroll clients from community referrals was not part of the original study design, but an opportunity that arose spontaneously as a result of community demand for service. By responding to this community need, the Birth to 3 Program quickly strengthened linkages and credibility among the network providers with whom advocates and clients worked. Strong community support ultimately brought another goal of the study to fruition, namely the continuation of the Birth to 3 Program as the Parent-Child Assistance Program (P-CAP) through community and state funding after the federal demonstration funds were expended.

Ultimately, anticipated cost benefits to the state were an important factor in legislative action to fund and expand the program. The costs of the P-CAP program are \$3,800 per client per year in 1997 dollars for direct program services. To cite some examples of reduced costs to the public and the potential for the program to pay for itself: 1) During the program, 17 Birth to 3 clients chose tubal ligation or Norplant birth control methods. If each of these women had delivered just one more child, the health care costs alone (pregnancy and the baby's first two years of life) for these 17 would total approximately \$195,500 (Schrager et al., 1995), an amount equal to the cost of providing P-CAP services for one year to 51 new clients. 2) By 36 months, the program demonstrated a 21% reduction in mothers on public assistance. Each woman no longer on welfare and food stamps reduces costs to the state by approximately \$7,750 per year (for a woman and one child). 3) Of 15 children allowed by CPS to go home with their mothers after delivery only because of enrollment in this program, 10 (67%) were still in their mother's custody after 3 years. Each child no longer in foster care reduces costs to the public by at least \$7,800 per year.

Exact cost-savings of home visitation programs to the public over the long-term are difficult to ascertain (Olds et al., 1998). As a holistic intervention, many areas may be af-

ected in ways that will eventually result in decreased costs to the public. Among areas of expected impact are: a) reduced future births of alcohol- and drug-affected children as a result either of the mother's abstinence from alcohol and drugs or use of effective birth control; b) decreased welfare costs as women stay in recovery and become able to work; c) decreased foster care costs as more women become able to care for their children; d) decreased child abuse and death as a result of increased monitoring by an advocate closely involved with the family; e) decreased costs of crime as alcohol and drug use decreases. Such long-term effects may become evident only years after intervention.

Development of new services not originally included and on-going evaluation to study their effectiveness is part of P-CAP. These include expanding enrollment criteria to include mothers who themselves may be fetal alcohol affected (Grant et al., 1997b) and providing varying lengths of program advocacy according to the needs of individual mothers. Incorporating a more specific focus on parent-child interactions (Sumner et al., 1990) and cognitive stimulation of children (Levenstein, 1992) would also be important adaptations especially considering the high-risk nature of these cohorts of young children.

The costs to society, the alienation of these alcohol- and drug-abusing mothers, and the toll on each new generation of exposed and maltreated children are high. Meaningful responses to these problems require commitment and collaboration among the scientific research community, health and social service agencies, and policymakers who are gatekeepers to funding at the community level.

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