

## INTERNATIONAL ARTICLE

# Impact of an Empowerment-based Parent Education Program on the Reduction of Youth Suicide Risk Factors

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**Purpose:** To evaluate the impact of parent education groups on youth suicide risk factors. The potential for informal transmission of intervention impacts within school communities was assessed.

**Methods:** Parent education groups were offered to volunteers from 14 high schools that were closely matched to 14 comparison schools. The professionally led groups aimed to empower parents to assist one another to improve communication skills and relationships with adolescents. Australian 8th-grade students (aged 14 years) responded to classroom surveys repeated at baseline and after 3 months. Logistic regression was used to test for intervention impacts on adolescent substance use, delinquency, self-harm behavior, and depression. There were no differences between the intervention (n = 305) and comparison (n = 272) samples at baseline on the measures of depression, health behavior, or family relationships.

**Results:** Students in the intervention schools demonstrated increased maternal care (adjusted odds ratio [AOR] 1.9), reductions in conflict with parents (AOR .5), reduced substance use (AOR .5 to .6), and less delinquency (AOR .2). Parent education group participants were more likely to be sole parents and their children reported higher rates of substance use at baseline. Intervention impacts revealed a dose-response with the largest impacts associated with directly participating parents, but significant impacts were also evident for others in the intervention schools. Where best friend dyads were identified, the best friend's positive family relationships

reduced subsequent substance use among respondents. This and other social contagion processes were posited to explain the transfer of positive impacts beyond the minority of directly participating families.

**Conclusions:** A whole-school parent education intervention demonstrated promising impacts on a range of risk behaviors and protective factors relevant to youth self-harm and suicide. © Society for Adolescent Medicine, 2002

**KEY WORDS:**

Suicide  
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Youth suicide is an increasing problem in Australia, which has suicide rates similar to the United States, Canada, and Norway [1]. Modifiable risk factors for youth suicide have been identified across a range of domains including community suicide prevalence, media reporting, parental mental health, family relationships, and youth mental health and behaviors [2]. Individual-level factors associated with youth suicide include: depression [3], anxiety, aggression, substance use [4], hopelessness [5], gender, impulsivity, and prior suicidal behavior [6]. Family-level associations include low family support [4], parental criticism, overprotection, low bonding [5], poor family relationships, conflict, low expressiveness, and low family cohesion [7].

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Well-controlled intervention studies have demonstrated that family interventions can have important effects on adolescent outcomes, including substance use [8–10], juvenile offenses, [11], and conduct disorder [12]. Recent evidence suggests universal school-based targeting of education programs for parents of adolescents can improve protective factors such as parent-adolescent bonding [13] and communication [14]. Positive adolescent behavioral changes have been documented 2 years after educational intervention with parents of early adolescents [15].

Reports of universal parent and family interventions commonly cite difficulties recruiting families with low education and other characteristics that may be risk factors for poor youth outcomes [16]. Typically, evaluations limit reporting of outcomes to families entering interventions. However, two lines of evidence suggest that intervention impacts may extend beyond immediate intervention participants. Firstly, there is evidence that healthy relationships with adults outside the family can positively influence adolescent development [17,18]. Effective communication with friends' parents has been demonstrated to benefit adolescents [17]. This finding is consistent with evidence of a protective effect where adolescents report positive relationships with adults outside their family [18]. Secondly, there is evidence that social support for parents may itself be an important factor modifying parental effectiveness [19]. Each of these lines of evidence suggests that, in settings such as schools where a range of adult and peer interaction takes place, there is the potential for widespread informal effects through parent interventions. Therefore, parent education groups that aim to enhance parents' social networks and increase skills for communicating with adolescents may have benefits for a range of relationships beyond the immediate families of participating parents.

This study evaluated the impact of a universal parent education program delivered to families with children in early high school. The main aim was to evaluate the effectiveness of the program as a method of reducing adolescent risk factors implicated in youth suicide. By training a critical mass of parents in the program, it was expected that a more widespread improvement in adolescent behavior could be achieved. Therefore, the effect of the program on 8th-grade adolescents was investigated at a classroom level. It was hypothesized that delivery of the program would reduce youth suicide risk factors for adolescents whose parents directly participated and also for adolescents whose parents did not directly participate in parent education groups.

## *Methods*

### **Procedures**

The authors were contracted as external evaluators and did not participate in program delivery, which was managed by Parenting Australia in Melbourne. This study aimed to examine the effect of the program on school students and represented one component within a broader set of evaluation activities. Ethical approval was provided through the University of Melbourne Human Research Ethics Committee and the relevant education sector ethics committees in each state.

Site recruitment activities were coordinated by Australian family service agencies with a history of local work with disadvantaged families and families in crisis. Selected staff (230), mainly from Anglicare and Centacare family services in 18 sites, representing all States and Territories of Australia, underwent 3-day training as group facilitators in the delivery of the sequential Australian parent education program Parenting Adolescents: A Creative Experience (PACE) [20]. Group facilitators were contracted to organize groups and recruit parents. Parents of 8th-grade students were the primary target as this grade was considered an important period for the emergence of adolescent family conflict and declining parental influence [21]. Australian high schools include grades 7 to 12 in all except for two states (Western Australia and Queensland) where high school begins at grade 8 (approximately age 14 years). Group facilitators organized groups either in schools or in other community settings. Across Australia, PACE groups were delivered to approximately 3000 parents. The present study explored the effect of PACE groups on 8th-grade students within school settings.

Where schools provided contact details, the investigators mailed surveys to parents seeking their consent to participate with their adolescent in the study. Schools not releasing contact details mailed the surveys directly to parents. After receipt of consent from both the parent and the adolescent, participating schools coordinated the administration of the "Young Persons' Survey" to 8th-grade students under teacher supervision. School surveys were administered midyear in all schools and then readministered 3 months later toward the end of the year. Surveys aimed to compare changes in the intervention schools where PACE groups were being completed between the survey periods with the control schools where the PACE groups were not offered. Confidential codes were used to match re-

sponses over time, and adolescents were asked to nominate their "best friend." These procedures enabled analyses of families across time and the examination of informal transmission of intervention effects within peer groups.

### Sample

Twenty-eight school campuses (14 intervention and 14 control), both government and nongovernment, and from metropolitan, rural, and remote communities participated. Note that an earlier report [22] referenced school administrative units rather than school campuses (buildings).

A matched comparison design was used, with regional staff nominating intervention schools. Control schools were selected to match the region, size, and government status of intervention schools. Depending on the size of each school, either one or two classrooms of 8th-grade students were randomly selected (representing 25% of 8th-grade students in the control and intervention schools). Active consent procedures that involved mailing all parents in the selected classrooms to request their family's participation yielded a sample of 577 volunteers representing 60% of targeted families (intervention  $n = 305$ , control  $n = 272$ ). Of this sample, 78% were retained through to follow-up.

### Curriculum

PACE was the curriculum used in this intervention [20]. It is a universally targeted intervention delivered to groups of parents by trained facilitators. Graduate-level group facilitators were trained to emphasize an adult learning environment, aiming to empower parents by teaching group problem-solving skills. PACE curriculum sessions were sequenced to cover adolescent development, listening, assertiveness, conflict resolution, authoritative parenting, substance use, and adoption of attitudes of optimism and hope. Curriculum materials were reinforced through parent discussion, pamphlets and booklets, and behavioral homework assignments. Facilitator surveys revealed a high level of adherence to the PACE curriculum [22]. Groups of around 10 parents ran for an average of seven sessions. Retention of parents through all sessions of PACE groups averaged 77% [22].

PACE groups were offered at no charge to all parents of 8th-grade students. Invitations to participate were circulated through parent informa-

tion evenings, school newsletters, and brochures. School welfare staff also directly approached selected parents known to be experiencing difficulties. Recruitment of parents into PACE groups varied among schools. Based on school population records, the average proportional participation was about 10%.

### Measures

To evaluate behavioral effects, self-completed, pencil and paper survey instruments, each comprising approximately 120 items, were developed for both adolescents and one parent in each family. The present analyses report only adolescent measures.

*Adolescent behavior.* Self-reported adolescent behavior was recorded using four response options ("never," "yes prior to last year," "yes last year," "yes in the last 60 days"). *Delinquent behavior* was assessed with seven items ("got into physical fights with other people," "damaged something on purpose in a public place," "stolen something," "driven a car without permission," "been suspended or expelled from school," "done graffiti in public places," "wagged [skipped] school"). Involvement in two or more of the seven behaviors defined delinquency. *Substance use* was assessed with five items ("tried sniffing to get high [e.g., glue, petrol, aerosols]," "used marijuana," "smoked cigarettes," "drank alcohol," "got drunk on alcohol"). Substance use was defined by involvement in any of the five behaviors. Multiple substance use referred to involvement in two or more substance use behaviors and excluded "drank alcohol." Two items were included to indicate *self-harm behavior* ("DELIBERATELY done something that I knew might have killed me") and suicidal thoughts ("thought of doing away with myself"). *Suicidal behavior* was indexed by a history of one or more deliberate acts of self-harm combined with suicidal thoughts. *Depressive symptoms* were indexed by a score of 10 or above on an existing measure of adolescent depression [23].

*Family measures.* Family measures included conflict with parents, and parental care and control. *Conflict with parents* was assessed by adapting an existing measure [24]. Respondents estimated the number of times in the previous 30 days incidents of conflict had been resolved using any of six negative strategies ("insult or swear at your parent/s," "sulk and/or refuse to talk about it," "give in; threaten to hit or throw something at your

parent/s," "throw or smash or hit or kick something," "push or grab or shove or hit your parent/s"). A count of such incidents provided a continuous measure of negatively resolved conflict. Mother's and father's *parental care and control* were assessed separately by adapting an existing instrument [25]. The four items assessing care were "seems to understand my problems," "makes me feel better when I am upset," "helps me as much as I need," "seems NOT affectionate (emotionally cold) to me." The items assessing control were "tries to control everything I do," "treats me like a baby and tries to protect me from everything," "likes me to make my own decisions," "gives me as much freedom as I want." Items were scored based on four response options: "almost always," "often," "occasionally," and "rarely or never." Continuous measures of parental care and control behaviors (assessed over the past 30 days) were trichotomized to establish low and high scores one standard deviation above or below the mean (approximately 15% extreme of distributions). As 31% of respondents scored maternal care at the highest level, this score was used as the criterion for high maternal care.

### Statistical Analysis

Data analyses were conducted using STATA software [26]. Prevalence estimates and statistical tests used the STATA "svy" command to calculate standard error estimates adjusted for the design effect introduced by the school-level clustering of student responses. Logistic regression, or linear regression for continuous outcomes, was used to assess intervention impact. Separate analyses investigated the effect of the intervention on the dependent variable (measured at post-test) after controlling for pre-test scores.

A further set of transition analyses examined specific prevention goals relevant to delaying entry to, and encouraging early cessation of, substance use and delinquency. To investigate the intervention impact on delaying entry to substance use and delinquency, selected samples of adolescents reporting non-involvement at the first survey (T1) were examined for differences in prevalence rates at the second survey (T2). To investigate the intervention impact on encouraging cessation, adolescents who reported having engaged in the relevant behavior at T1 were compared for behavior at T2. Changes in intervention schools were compared with changes in control schools.

## Results

### Prediction of Suicidal Behavior

At T1, 12% (95% Confidence Interval [CI], 9–15) of respondents reported they had engaged in self-harm and experienced suicidal thoughts. Suicidal behavior was associated with a number of individual and family variables. At the family level, prevalence was linearly associated with student reports of parent-adolescent conflict, and both maternal and paternal care. For adolescents reporting "0 to 1" negatively resolved conflicts in the previous month, suicidal behavior was very low (3%: CI, 0–6). Suicidal behavior steadily increased with number of conflicts: two to five conflicts (7%: CI, 4–10), six to twelve (13%: CI, 9–17), and thirteen or more (30%: CI, 21–39). The rate of suicidal behavior was approximately double for those low on maternal (26%: CI, 18–34) or paternal care (24%: CI, 16–32), but was approximately half for those high on maternal (7%: CI, 3–11) or paternal (5%: CI, 0–10) care. Maternal and paternal control each demonstrated a nonlinear relationship with suicidal behavior. Rates of suicidal behavior were similar for youth reporting low (one standard deviation below the scale mean) maternal (13%: CI, 7–19) or paternal (15%: CI, 7–23) control, but were reduced for moderate (within one standard deviation of the mean) maternal (8%: CI, 5–11) or paternal (8%: CI, 5–11) control. Rates of suicidal behavior were approximately double for high maternal (24%: CI, 15–33) or paternal (23%: CI, 14–32) control.

Multivariate logistic-regression modeling of family-level factors demonstrated that the odds of suicidal behavior were elevated where thirteen or more negatively-resolved conflicts were reported each month: (Adjusted Odds Ratio (AOR) 3: CI, 2–5). These odds were reduced where five or fewer such conflicts were reported (AOR 0.3: CI, 0.1–0.6) and/or where maternal control was moderate (AOR 0.4: CI, 0.3–0.8). Multivariate logistic modeling of individual-level variables demonstrated that the odds of suicidal behavior were elevated for those reporting high depressive symptoms (AOR 6.5: CI, 3.7–11.4), involvement over the past year in multiple substance use (AOR 2.4: CI, 1.5–3.7), and/or delinquency (AOR 6.3: CI, 2.7–14.9). Once individual-level factors were entered into the logistic model, family factors were no longer significant, suggesting a strong association between family and individual-level suicide risk factors.

**Table 1.** Parent Characteristics at Baseline (T1)

	Control %	Intervention %
Age <40 years	33	44*
Non-Australian born	20	32*
Home ownership/purchasing	85	87
Pension/welfare benefit	18	17
<10th grade education	9	12
Experience financial strain	25	26
Single/divorced/separated	17	14
>3 dependent children	19	14
Fathers responding to survey	10	18

\**p* < .05

Source: Parents' survey respondents (N = 538)

### Baseline Equivalence in Intervention and Control Schools

Analyses were conducted to establish baseline group equivalence between the control and intervention schools on a range of parent sociodemographic variables. Logistic regression comparisons revealed few differences between the intervention and control parents at T1. As shown in Table 1, there were significant differences for the intervention schools, in that more were from a non-Australian country of birth and more were aged below 40 years. These two demographic differences were examined for main or interaction effects on outcomes, but no effects were found.

As shown in Table 2, analyses of adolescent self-

report variables revealed no differences between control and intervention schools at T1. There were no significant differences in adolescent behaviors (substance use, multiple substance use, delinquency, depressive symptoms, self-harm) or family measures (parent-adolescent conflict, maternal and paternal care and control). The impact of the intervention on each of the suicide risk factors was examined.

### Intervention Impacts on Adolescent Behaviors

In the 60 days before T1, 32% (CI, 26–38) of control and intervention adolescents reported engagement in substance use. Intervention effects are shown in Table 2. At T2 recent substance use remained stable in the intervention schools (33%: CI, 26–41) but increased in the control schools (46%: CI, 36–56). After adjusting for T1 substance use, the odds of T2 substance use was significantly reduced for students in the intervention schools (Adj OR 0.6: CI, 0.4–0.9). Intervention impacts appeared to be relevant to reducing initiation and escalation, but not cessation, of substance use. Of those reporting never having engaged in substance use before T1 (n = 146), 12% were recent substance users by T2. There was a nonsignificant trend for lower initiation among those exposed to the intervention (OR 0.6: CI, 0.2–1.8). Of those reporting no recent substance use at T1 (n = 302), 24% were recent substance users by T2. The odds of transition to substance use were halved in

**Table 2.** Adolescent and Family Assessments Across First (T1) and Second (T2) Surveys Comparing Control and Intervention Samples

	T1		T2		Adjusted ORa (95% CI)
	Control % (95% CI)	Intervention % (95% CI)	Control % (95% CI)	Intervention % (95% CI)	
Adolescent behaviors					
Substance use <sup>b</sup>	33 (22–44)	31 (23–39)	46 (36–56)	33 (26–41)	0.60 (0.39–0.92)
Multiple substance use <sup>c</sup>	15 (10–20)	13 (7–19)	21 (15–26)	13 (4–21)	0.49 (0.24–0.98)
Delinquency <sup>b</sup>	10 (6–14)	9 (6–12)	16 (10–22)	5 (3–7)	0.21 (0.09–0.47)
Depressive symptoms <sup>d</sup>	28 (23–32)	27 (22–32)	26 (21–31)	24 (17–30)	0.83 (0.51–1.45) <sup>e</sup>
Self-harm <sup>b</sup>	7 (4–10)	6 (2–10)	8 (4–12)	5 (0–10)	0.80 (0.50–1.30) <sup>e</sup>
Suicidal behavior <sup>b</sup>	3 (0–6)	3 (0–6)	4 (1–7)	3 (0–6)	0.80 (0.39–1.64) <sup>e</sup>
Family measures					
Parent-adolescent conflict <sup>d</sup>	50 (43–57)	49 (42–56)	51 (43–59)	37 (30–44)	0.48 (0.32–0.72)
High maternal care <sup>d</sup>	31 (25–37)	33 (24–42)	27 (21–33)	38 (28–48)	1.93 (1.19–3.13)
High paternal care <sup>d</sup>	12 (6–18)	14 (9–19)	13 (7–18)	15 (9–20)	1.19 (0.56–2.57) <sup>e</sup>
Moderate maternal control <sup>d</sup>	66 (60–72)	71 (67–75)	67 (61–73)	66 (60–72)	0.99 (0.69–1.43) <sup>e</sup>
Moderate paternal control <sup>d</sup>	71 (64–78)	71 (65–77)	70 (66–74)	65 (58–72)	0.78 (0.57–1.05) <sup>e</sup>

<sup>a</sup> Odds ratios for effect of intervention at T2 adjusting for baseline (T1) scores.<sup>b</sup> Last 60 days.<sup>c</sup> Past year.<sup>d</sup> Last 30 days.<sup>e</sup> Nonsignificant difference

the intervention schools (OR 0.5: CI, 0.3–0.9). Of those reporting substance use at T1, rates of substance use at T2 were 74% and there were no significant differences for those exposed to the intervention.

At T2, involvement in multiple substance use over the previous year had remained stable in the intervention (13%: CI, 4–21) but increased for the control students (21%: CI, 15–26). After controlling for T2 behavior, multiple substance use was significantly reduced for the intervention students (AOR 0.49: CI, 0.24–0.98).

At T2, recent delinquent behavior (previous 60 days) showed a reduction in the intervention schools but increased in the control schools. After controlling for T1 delinquency, the odds of T2 delinquency were substantially reduced for those in the intervention schools. The intervention appeared to influence both initiation and cessation of delinquency. For youth who did not report recent delinquency at T1 ( $n = 397$ ), the rate of recent delinquency at T2 was 7%. For these youth, the odds for transition to delinquency were reduced in the intervention schools (OR 0.3: CI, 0.2–0.7). For youth who reported recent delinquency at T1 ( $n = 36$ ), the rate of T2 delinquency was 56%. For these youth, the odds of delinquent behavior at T2 were significantly reduced in the intervention schools (OR 0.06: CI, 0.01–0.28).

At both T1 and T2, there were no significant differences between intervention and control adolescents for depression symptom scores. Both logistic regression and linear regression examining the continuous measure of depressive symptoms failed to reveal significant intervention impacts.

Recent suicidal behavior (previous 60 days) was stable over both time periods across the two conditions. Rates of recent self-harm were similar at T1, but showed a nonsignificant difference at T2 with lower rates for the intervention students.

### Intervention Impacts on Family Measures

At T2, rates of conflict reduced for the intervention students, but remained stable for the control students. After adjustment for baseline conflict (by including pre-test conflict scores in the regression equation), exposure to the intervention schools approximately halved the odds of negative conflict, as shown in Table 2. The table shows that at T2, high maternal care (rating the maternal care scale at the highest level) had increased for the intervention students relative to the controls. After adjustment for T1 scores, being in an intervention school almost doubled the odds of high

maternal care at T2. The intervention was not associated with a similar effect for paternal care. Ratings of high paternal care were low at both time points in both the intervention and control schools.

### Dose-Response Analyses

Analyses were conducted to establish whether intervention effects were associated with the extent of parental participation in PACE within schools. Analysis revealed a greater intervention impact on reduction of negatively resolved conflicts with parents in schools where 10% or more of the parents attended PACE (AOR 0.3: CI, 0.2–0.5). Intervention effects were also evident in schools with lower parent participation (AOR 0.6: CI, 0.4–0.9). Reductions in substance use, delinquency, and improvements in maternal care appeared similar across the schools with different intervention intensities.

Chi-square analyses were used to compare parents participating in PACE with other parents in the intervention schools. Parents participating in PACE were not generally different on demographic or socioeconomic factors, except that they were more frequently sole parents (28% vs. 12%). There were significant differences between youth in families volunteering to attend PACE groups compared with other youth in intervention schools. For youth in PACE families in the year before T1, there was greater multiple substance use (25% vs. 12%), drunken alcohol use (24% vs. 6%), more marijuana use (21% vs. 7%) and more sniffing of substances (21% vs. 4%) compared with others in the intervention schools.

Table 3 shows that at T1, adolescents in the PACE participating families were not significantly different in levels of delinquency, negative family conflict, or maternal care. Examination of intervention effects, however, demonstrated evidence for dose-response effects. Adjusted odds ratios predicting T2 behaviors demonstrated a trend for larger effects for intervention school families who participated in PACE for improvements in maternal care, reductions in conflict, multiple substance use and delinquency. However, significant effects were still evident for intervention school families that did not directly participate in PACE.

### Transmission of Intervention Impacts Through Youth Friendship Networks

At T1, youth were asked to name their best friend and 242 named a best friend who was also a respon-

**Table 3.** Adolescent and Family Assessments Comparing Intervention School Families Participating and Not Participating in PACE With Control School Families

	T1 % (95% CI)	T2 % (95% CI)	Adjusted OR <sup>a</sup> (95% CI)
Multiple Substance Use (past year)			
Intervention school—PACE	25 (0–51)	6 (0–21)	0.09 (0.01–0.90)
Intervention school—other	12 (5–20)	13 (3–22)	0.54 (0.28–1.06)
Control school	15 (10–20)	21 (15–26)	
Delinquency (last 60 days)			
Intervention school—PACE	6 (0–19)	0 (0–)	~
Intervention school—other	9 (5–13)	5 (3–7)	0.22 (0.10–0.50)
Control school	10 (6–14)	16 (10–22)	
Parent-Adolescent Conflict (last 30 days)			
Intervention school—PACE	38 (16–60)	25 (2–48)	0.30 (0.08–1.01)
Intervention school—other	49 (41–57)	37 (30–44)	0.50 (0.33–0.71)
Control school	50 (43–57)	51 (43–59)	
High Maternal Care (last 30 days)			
Intervention school—PACE	40 (7–73)	53 (33–73)	3.7 (1.2–11.0)
Intervention school—other	33 (24–42)	37 (30–44)	1.8 (1.2–3.0)
Control school	31 (25–37)	27 (21–33)	

~ Unable to estimate parameter

<sup>a</sup> Odds ratios for effect at T2 relative to control after adjusting for baseline (T1) and alternative intervention exposure condition.

dent in the study. Comparing respondents who did and did not nominate a best friend, there were no differences in T1 delinquency, substance use, negative conflicts with parents or maternal care. Logistic regression analyses were conducted to examine the effect of best friend's behavior and family environment on the respondent's behavior.

Analyses compared transitions to reported substance use with the year before each measurement. Among respondents who reported no substance use in the year before T1, best friend's substance use did not alter the respondent's rate of transition to substance use at T2. However, best friend's substance use appeared to influence a range of specific substance use behaviors including the respondent's drunken alcohol use, smoking, marijuana use, and sniffing. For respondents reporting no drunken alcohol use at T1, the rate of drunken alcohol use at T2 was 5% for respondents whose best friends did not use substances at T1. However, where friends had used substances at T1, the odds of drunken alcohol use at T2 increased fivefold (OR 5: CI, 2–17) to 20%. The odds of transition to drunken alcohol use were increased either where the respondent (OR 3: CI, 1–6) or the best friend (OR 5: CI, 1–18) reported high negatively resolved conflict with parents at T1. The continuous measure of best friend's maternal care at T1 was also found to exhibit a linear protective effect, reducing the likelihood of the respondent's transition to drunken alcohol use (OR 0.82: CI, 0.68–0.99), smoking (OR 0.78: CI, 0.63–0.98) and marijuana use (OR 0.76: CI, 0.58–0.99) at T2.

### Transmission of Intervention Impacts Through Parent Networks

One survey question asked whether parents had spoken about parenting with another parent who participated in PACE, and 4% of parents who had not participated in PACE replied "yes" to this question. Inspection of parent responses in this small group of families revealed a significantly higher rate of parent-adolescent conflict at T1 ( $p = .03$ ), which tended to decrease by T2 (nonsignificant trend).

### Discussion

The present study is the first evaluation reported of a preventive intervention using parenting education in high schools to reduce risk factors for youth suicide. Cross-sectional analyses confirmed previous research associating youth suicidal behavior with family and individual risk factors [3–5,7]. The present evaluation extended previous research; firstly, by demonstrating that parent education delivered through high schools can positively affect a number of youth suicide risk factors. Secondly, the study demonstrated effects beyond the minority of families who can typically be encouraged to directly participate in interventions. Previous research has demonstrated positive effects on adolescent behavior of parent education in high schools [13–15]. This is the first demonstration of effects on those not directly participating in interventions.

Evidence suggested that in schools exposed to the

intervention, increases in substance use, delinquency, and family conflict were attenuated and maternal care improved. Youth behavior changes were associated with impacts on hypothesized family intervention targets. Reductions were observed in parent-adolescent conflicts, and maternal care improved. Effects were observed despite a very low proportion of parents participating in the intervention. An important set of analyses explored the processes underlying the transmission of intervention effects. Intervention impacts on parent-adolescent conflict demonstrated a dose-response relationship with greater effects associated with higher levels of parental participation in the intervention. Parents reporting participation in PACE groups were more likely to be sole parents and/or to have children reporting substance use behaviors. Adolescents in these families demonstrated an overall reduction in substance use over the course of the intervention. A further set of analyses explored the transmission of intervention effects across youth peer networks. There was evidence that adolescent transitions to substance use behavior were influenced by best friend's family relationships.

These findings suggested that peer relationships might be one mechanism by which intervention impacts were transmitted beyond the minority of parents directly participating in the intervention. PACE explicitly taught parents how to problem-solve to assist each other with difficult parenting issues, and hence parents were explicitly empowered to assist other parents. Parent-adolescent conflict declined in a small group of families where parents did not participate directly in PACE but stated they had spoken with a parent who had participated. These limited observations provided some suggestive evidence that informal parent education may have been one further mechanism by which intervention impacts were transmitted from PACE participants to nonparticipants.

The study findings emphasize the importance of explicitly designing and evaluating interventions to harness and assess informal methods of transmitting intervention impacts. Interventions that empower parents to assist other parents and that encourage respectful adolescent communication are likely to have an impact that extends beyond the immediate participants. Although the present intervention was targeted to all parents, the effect on the school community appeared to operate through the reduction of negative peer influences by decreasing adolescent substance use in self-selected high-risk families. The present intervention began by providing

PACE training to family service staff that had previous experience working with disadvantaged families. The experience of these staff may have been an important intervention component underlying their success in recruiting high-risk families into the parent education groups.

### Limitations

As schools were not randomly assigned to the intervention, it was important to evaluate the possibility that the intervention schools were in some way different at T1 relative to the control schools. Examination revealed little support for this proposition. Schools were closely matched for size, region, and sector (government and nongovernment). There were no differences between family types, or on indicators of parental socioeconomic status. Parents did differ slightly on ethnicity, but analyses controlling for these differences suggested little implication for the measurement of intervention impacts. Youth behavior and reports of family relationships demonstrated no differences, and youth ratings of school attachment were also equivalent at T1.

The response rate for this evaluation was low, warranting caution in attempts to generalize findings. Despite the low response rate, the prevalence of students' self-reported behaviors corresponded closely with representative Australian student surveys. For example a 1999 Victorian student survey found that from grade 7 to 9 reports of having been drunk on alcohol increased from 13% to 42% [27]. These figures were consistent with the present study where drunken alcohol use increased from 25% at T1 to 34% at T2 in the grade 8 controls.

### Conclusion

There are two important implications from the present findings. Firstly, school-based parent education appeared to reduce risk factors for youth suicide. Secondly, these reductions were observed not only in youth whose parents had participated in the intervention, but also in youth whose parents had not directly participated. This appeared to result from the informal transmission of intervention impacts by way of youth friendship networks and communication among parents. Further investigation of this important and promising finding is indicated. The present study accords with public health guidelines recommending the development and evaluation of universal interventions designed

to reduce risk factors and promote protective factors to address identified public health problems [28]. Available evidence associated exposure to the intervention with positive short-term effects on relevant risk factors. Future research should examine whether the effects demonstrated in the present study can be independently replicated within a more rigorous design over a longer period.

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