Randomised controlled trial using social support and financial incentives for high risk pregnant smokers: Significant Other Supporter (SOS) program

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Smoking cessation interventions have posed significant challenges for health professionals, particularly when directed at high risk, low income, pregnant smokers. Typical quit rates for pregnant women who receive publicly financed obstetrical care have rarely exceeded 12–16%.[1] As many as 70% of women who quit smoking during pregnancy relapse within one year of delivery.[2] Two areas that have received particular attention as possible adjuncts to behaviour change are the use of reinforcements and social supports. Reinforcement in the form of incentives/rewards for positive behaviours has been controversial as an intervention strategy. Some argue that the "overjustification effect" of external rewards may cause subjects to lose internal motivation to modify behaviour over the long term.[3] However, results of several studies, including two meta-analyses on reinforcement, provide compelling evidence that positive reinforcement provides positive behavioural changes.[4–8]

A second area of study that has been explored in the behaviour change research is the role of social support in motivating and sustaining selected behaviour change. Recent studies have empirically linked tobacco quit rates with daily interaction with a supportive "other," preferably one who did not smoke.[9 10]

The primary objective of our intervention was to determine whether the combination of bolstered social support and financial incentives had an effect in significantly reducing smoking behaviour among low income, high risk, pregnant and postpartum women who participate in Oregon's Women, Infants, and Children (WIC) program.

Methods

The Significant Other Supporter (SOS) program was a randomised, experimentally designed smoking cessation study implemented in four Oregon WIC program sites. Criteria for entry into the study included the following: age 15 years or older; self reported smoker ("even a puff in the last seven days"); English speaker/reader; WIC eligible; and 28 weeks gestation or less. Eligible subjects were randomised into one of two groups, and were asked to sign an informed consent, resulting in recruitment of 220 pregnant smokers (112 treatment group, 108 control group) from 309 eligible pregnant women. The overall participation rate for this intervention was 71%. Predetermined withdrawal criteria included pregnancy termination and fetal demise. Participants were followed through two months postpartum (maximum of 10 intervention months). Recruitment occurred between June 1996 and June 1997, and data collection was completed in January 1998.

Participants completed written surveys and salivary specimen collections, analysed for cotinine regardless of smoking status, at each of three assessments: baseline, eight months gestation, and two months postpartum. All participants received a participation voucher (value of $5.00) at each assessment. The salivary cotinine cut off value used to distinguish smokers from non-smokers was 30 ng/ml. An additional saliva specimen was collected and was either stored if the participant self-reported as a smoker, or analysed for thiocyanate if the participant self reported "not having smoked a cigarette, even a puff, in the last seven days". We utilised thiocyanate to confirm quickly the treatment group quitters because it is a relatively inexpensive analysis that can be performed locally and it allowed for the quick turnaround necessary to reinforce successful quitters. The salivary thiocyanate cut off value was 100 μg/ml.

At baseline, all participants were given verbal and written information on the importance of smoking cessation and all participants received a pregnancy/maternal specific, evaluated, smoking cessation self help kit, *A pregnant woman's guide to quit smoking*.[11] This brief educational intervention was delivered by trained WIC program or SOS program research staff. Treatment participants were asked to designate a social supporter, preferably a female non-smoker with whom the participant had a regular, close, positive association. Each treatment participant was informed that both she and her social supporter were eligible to receive incentive vouchers if she was biochemically confirmed as quit. Social supporters received a consent form in the mail, a descriptive pamphlet, and a survey to return by mail.

All participants were telephoned monthly (maximum of 10 months), and were asked to self report their smoking status. If the participant self reported as quit, she returned to the WIC site for saliva specimen collection. A specimen for thiocyanate was analysed, and if confirmed as quit, treatment participants received a $50 voucher, and their social supporter received a voucher as well.

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Our intervention strategy utilised a theory based "three pronged" approach to facilitate smoking cessation among pregnant and postpartum women: positive incentives, "bolstered" social supports, and community participation. This approach provided optimal opportunities for positive behaviour change by emphasising supportive, reciprocal relationships between smokers, their social supporters, and community partners for the treatment group. These are described as follows:

- Financial incentive vouchers worth $50.00/month for confirmed quitters were mailed each month through two months postpartum.
- Bolstered social support was provided for the social supporter of successful treatment quitters ($50.00 voucher the first quit month, $25.00 the additional quit months, and $50.00 the last quit month). The supporter's purpose was to offer "natural", peer support during the smoking cessation process to the woman who was trying to quit.
- Community participation by 10 Oregon "community partners" demonstrated that local resources could be effectively mobilised to reduce the need for "outside" financial assistance. Incentive vouchers were purchased with funds voluntarily donated from healthcare organisations, businesses, and foundations who held the belief that being smoke free during pregnancy carries a tremendous health, social, and cost benefit.

Results

The baseline demographic characteristics of the two groups are presented in table 1. Preliminary analysis indicates no significant differences exist between randomised groups on baseline demographic characteristics. Subjects were predominantly white, low income women who were in their early 20s, married or living with a partner, and who were screened as eligible for participation at approximately four months gestation.

The SOS program biochemically confirmed quit rates are presented in table 2. Quit rates for this study were analysed based on intention-to-treat, where all those lost to follow up were considered to be smokers, and all enrolled women who successfully carried their babies to term were included. A successful quitter was defined as self reporting "not smoking, not even a puff, in the last seven days", and was confirmed with salivary cotinine. Significant differences existed between treatment and control groups in percentages of smokers who were biochemically confirmed as quit at eight months gestation $\chi^2 = 18.4$ ($p < 0.0001$), and also at two months postpartum $\chi^2 = 11.0$ ($p < 0.0009$). Loss to follow up in both the treatment and control groups is noteworthy at each of the follow up assessments: (a) treatment loss to follow up was 32% at eight months gestation, and 36% at two months postpartum; (b) control loss to follow up was 51.5% at eight months gestation, and 52% at two months postpartum.

Table 1 SOS program baseline demographics

	Treatment group (n=112)	*Control group (n=108)*
Mean (SD) maternal age (years)	23.5 (5.7)	24.0 (5.8) (n=107)
Per cent non-white	10% (n=110)	12%
Per cent Latina or Hispanic	8% (n=109)	7.5% n=107
Mean (SD) gestation period (weeks)	16.6 (6.6)	16.4 (7.4)
Mean (SD) years of education attained	11.6 (2.0)	11.8 (1.7)
Per cent married or living with a partner	53%	58%
Percent household income < $20000	87%	89%
Mean (SD) salivary cotinine (ng/ml)	45.4 (40.1)	45.7 (47.5)
Mean (SD) salivary thiocyanate (μg/ml)	184.9 (79.5)	183.0 (91.2) (n=107)

Table 2 SOS program biochemically confirmed quit rates by randomised group

	Treatment group	*Control group*
Clients enrolled at baseline	112	108
Eight month gestation quit rate	32%* n=105	9%* n=102
Pregnancy termination or fetal demise (n)	7	6
Two month postpartum quit rate	21%† n=103	6%† n=102
Pregnancy termination or fetal demise (n)	9	6

*$\chi^2 = 18.4$ ($p < 0.0001$); †$\chi^2 = 11.0$ ($p < 0.0009$).

Discussion

The combination of bolstered social support and direct financial incentives significantly increased the likelihood of a higher than usual smoking quit rate among high risk pregnant women who participate in WIC programs. Results are consistent with previous research indicating that positive benefits may be derived from positive reinforcement and social support. This population in particular may be receptive to monetary incentives because of their low socioeconomic status, and the need for additional financial support for a newborn infant's needs. Preliminary statistical analysis does not allow us to comment on whether the combined effect of social support and financial incentives is greater than the sum of either social support or incentives applied independently. Consistent with the literature, we believe biochemical confirmation of quit status is essential for measurement purposes,[12] and may well be an important component of the intervention itself. Although analysis of salivary cotinine may be cost prohibitive for many researchers, we found salivary thiocyanate provided an economically feasible, practical, and sustainable mechanism for insuring quick and accurate assessments of quit status.

While women who completed this intervention appeared to quit smoking at rates that exceed national norms, it is important to note that the WIC environment provides a challenging research laboratory for smoking cessation. While WIC was an excellent conduit to this population, staff tended to be "stretched thin" and they had limited time to engage in research tasks. WIC in general has a loss to follow up/no show rate consistent with loss to follow up experienced with our intervention. Also, Oregon WIC program staff generally meet with clients only once during their pregnancy.

Overall, the preliminary analysis of this trial has yielded promising results. Further statistical analysis is planned, in conjunction with qualitative data, to explore the effects of

social support and incentives on this group of pregnant women.

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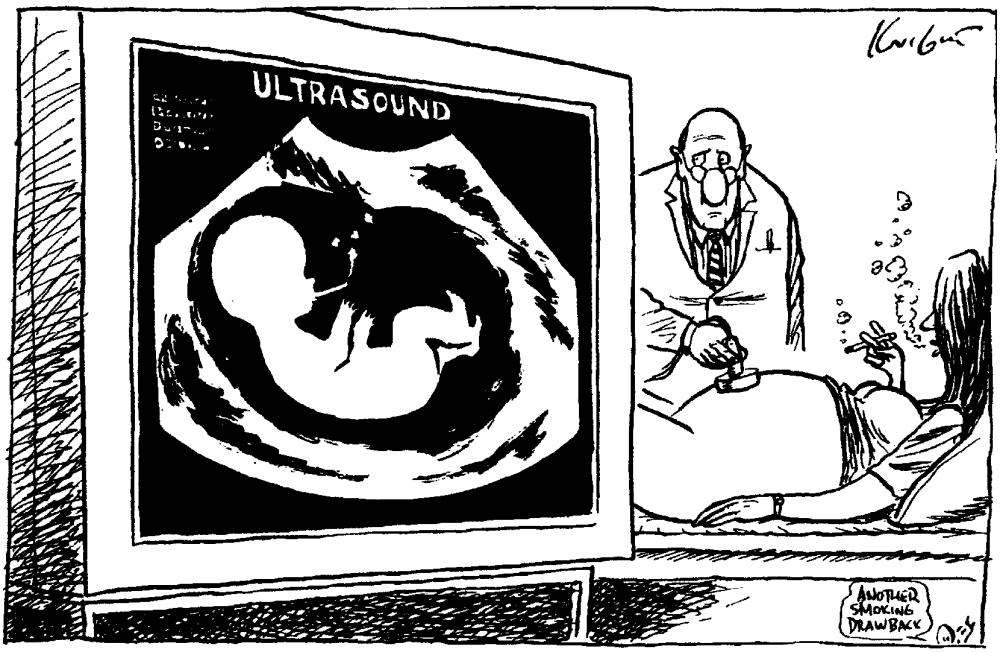

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