

Title: A randomized trial to promote health belief and to reduce environmental tobacco smoke exposure in pregnant women.

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Study summary:

Exposure to environmental tobacco Smoke is widespread among women in Iran. Smoking prevalence rate for Iranian women is low (3.4%), however the high smoking prevalence rate for Iranian men (21%) makes exposure to secondhand smoke (SHS) an important risk factor to women's health. The harmful effects of prenatal environmental tobacco smoke to the fetus have been documented to include: pregnant loss, low birth weight, preterm delivery, and fetal death.

The health believe model was used to offer a foundation for the development of tailored educational interventions to promote permanent avoidance of Environmental Tobacco Smoke (ETS). Within the construct of the health believe model, if a pregnant women thinks or feels that her baby is susceptible to harm as a results of her actions then the mother perceives that her baby is susceptible to her ETS exposure.

The hypothesis of this study was: i) health education for increased perception of risk of ETS exposure for pregnancy outcome can effect on the HBM construct and ii) health education is associated with lower ETS exposure.

This study aimed to explore the impact of education on health belief and environmental tobacco exposure in pregnant women in Iran.

Measurement:

A questionnaire consist of demographics, weekly number of ETS exposures at home, and health believe model constructs exposure were designed and face to face interviews conducted. A 15 item questionnaire was developed and chronbach's alpha was used to evaluate its internal consistency. Each of the constructs recorded chronbach's alpha of more than 0.7. ETS was measured by mean number of cigarettes per week that their spouses smoked at home near the participant.

Intervention:

A randomized trial was administered to 130 pregnant women exposed to Environmental Tobacco Smoke (ETS). The pregnant women were allocated into two groups of 65 each

by systematic randomization. Due to drop out and other reasons the analysis in the intervention group was done on 47 participants and 44 participants in the control. The intervention group was given education about EST exposure and the control group was given education for prevention of infections. Measurement was done at recruitment, third, fourth and fifth antenatal visit.

Results:

Table II. Comparison of HBM constructs between two groups by four times (analysis of variance) and correlation between HBM constructs and weekly ETS in intervention group at follow-up sections

	Intervention group (n = 47)	Control group (n = 44)	F	ETS
	Mean (\pm SD)	Mean (\pm SD)		r
Perceived susceptibility			7.44***	—
At intake	16.42 (\pm 2.42)	15.95 (\pm 4.16)		
At 3rd section	18.31 (\pm 2.08)	15 (\pm 2.64)		-0.51***
At 4th section	18.22 (\pm 0.83)	16.41 (\pm 2.78)		-0.3*
At 5th section	17.93 (\pm 2.23)	16.29 (\pm 3.27)		-0.43**
Perceived severity			5.48***	—
At intake	16.11 (\pm 2.21)	16.07 (\pm 3.76)		
At 3rd section	18.21 (\pm 1.33)	16.59 (\pm 2.68)		-0.44**
At 4th section	18.74 (\pm 2.08)	16.88 (\pm 3.11)		-0.31*
At 5th section	17.85 (\pm 2.24)	16.83 (\pm 2.76)		-0.31*
Perceived benefits			2.95**	—
At intake	20.62 (\pm 4.41)	20.84 (\pm 4.08)		
At 3rd section	22.26 (\pm 2.17)	21.23 (\pm 3.18)		-0.38**
At 4th section	22.53 (\pm 2.27)	21.19 (\pm 2.92)		-0.22
At 5th section	22.8 (\pm 2.1)	21.14 (\pm 2.94)		-0.19
Perceived barriers			0.62	—
At intake	6.81 (\pm 2.03)	6.86 (\pm 1.3)		
At 3rd section	6.6 (\pm 1.83)	6.88 (\pm 1.37)		0.2
At 4th section	6.47 (\pm 1.94)	6.86 (\pm 1.39)		0.11
At 5th section	6.57 (\pm 1.75)	6.93 (\pm 1.47)		0.09
Weekly ETS exposure			8.68***	—
At intake	31.62 (\pm 22.99)	31.77 (\pm 23.8)		
At 3rd section	13.42 (\pm 16.4)	27.59 (\pm 17.12)		
At 4th section	14.32 (\pm 16.8)	26.29 (\pm 12.1)		
At 5th section	12.28 (\pm 15.1)	25.39 (\pm 13.2)		

* $P < 0.05$ for between-group differences. ** $P < 0.01$ for between-group differences. *** $P < 0.001$ for between-group differences.

In the intervention group, perceived susceptibility/severity and perceived benefits increased and the weekly ETS exposure decreased on the third as opposed to the first section. In the intervention group, the mean weekly exposure at the third, fourth and fifth sections were significantly lower than of that for the control group. Consistent with the HBM, the scores on the perceived susceptibility/ severity construct at the third, fourth and fifth sections and the perceived benefits construct at the third section were associated with the weekly number of ETS exposures in the intervention group.

Table III. The results of LSD test (two groups by four times)

		Mean difference (I-J)			
I	J	Perceived susceptibility	Perceived severity	Perceived benefits	Weekly ETS exp.
I. group (S1)	I. group (S3)	-1.94**	-2.11***	-1.64*	18.19***
	I. group (S4)	-1.83**	-2.34***	-1.91**	17.30***
	I. group (S5)	-1.55**	-1.68**	-2.17**	19.33***
	C. group (S1)	0.33	0.03	-0.22	-0.16
	C. group (S3)	1.26*	-0.48	-0.61	4.03
I. group (S3)	C. group (S4)	-0.05	-0.77	-0.57	5.32
	C. group (S5)	0.05	-0.73	-0.53	6.23
	I. group (S4)	0.11	-0.23	-0.28	-0.89
	I. group (S5)	0.38	0.43	-0.53	1.14
	C. group (S1)	2.28***	2.14***	1.41*	-18.35***
I. group (S4)	C. group (S3)	3.21***	1.62**	1.03	-14.17***
	C. group (S4)	1.89**	1.33*	1.06	-12.90**
	C. group (S5)	1.99**	1.38*	1.11	-11.96**
	I. group (S5)	0.28	0.66	-0.26	2.04
	C. group (S1)	2.17***	2.38***	1.69*	-17.45***
I. group (S5)	C. group (S3)	3.1***	1.86***	1.30*	-13.27**
	C. group (S4)	1.71**	1.57**	1.34*	-11.98**
	C. group (S5)	1.88**	1.61**	1.39*	-11.07**
	C. group (S1)	1.89**	1.72**	1.95**	-19.49***
	C. group (S3)	2.82***	1.20*	1.56*	-15.31***
C. group (S1)	C. group (S4)	1.50**	0.91	1.60*	-14.01***
	C. group (S5)	1.60**	0.95	1.64*	13.10***
	C. group (S3)	0.93	-0.52	-0.39	4.18
	C. group (S4)	-0.39	-0.81	-0.35	5.48
	C. group (S5)	-0.29	-0.77	-0.30	6.39
C. group (S3)	C. group (S4)	-1.32*	-0.29	0.04	1.30
	C. group (S5)	-1.22*	-0.24	0.08	2.20
C. group (S4)	C. group (S5)	0.10	0.05	0.05	0.91

I. group, intervention group; C. group, control group; S1, intake section; S3, third section; S4, forth section; S5, fifth section; weekly ETS exp., weekly ETS exposure.

* $P < 0.05$ for between-group differences. ** $P < 0.01$ for between-group differences. *** $P < 0.001$ for between-group differences.

Analysis using the LSD test in the table above, indicated that there were no statistically significant differences in the HBM constructs between the study groups at the intake section. Therefore, two groups were equivalent on HBM constructs at the intake section. Compared with the control group, the intervention group reported significantly higher perceived susceptibility (at the third, fourth and fifth sections), perceived severity (at the third and fourth sections) and perceived benefits (at the fourth and fifth sections) for ETS exposure.

Conclusion:

Education about the impacts of ETS exposure of pregnant women is effective way to increase the theoretical constructs of the Health Believe model and such education reduced exposure to ETS.

Critic of the study

It is unclear whether the systematic randomization done in this study did not compromise the assignment of the participants in such a way that an unknown bias was more or less in one group than the other. The authors would have improved credibility of the study by explaining in deeper details how this systematic random allocation was done.

To limit interviewer bias, the person screening for eligibility was different from the person responsible for allocating them to the intervention and control group. I think that this part was creatively executed.

I was impressed by the clarity of focus of the intervention which was:

To increase the susceptibility and severity as well as benefits and reduce perceived barriers. This HBM constructs were evaluated using Cronbach's alpha, according to DeVellis 2003 - indicators of scale development, Cronbach's alpha of more than 0.7 is good enough for scale development. As seen in this study

In this study it is possible that a recall bias could have happened since the measurement of ETS exposure was based on the participants recall of the number of cigarettes their partners smoked per week while in the same environment with them (women) over a space of one month. In my opinion it is conceivable that some level of bias would have resulted from this. The authors could have improved this by finding an objective way of measuring the exposure or using a memory jogger such as a tally system every time such exposure happened.

Social desirability could have introduced a bias in the reporting of the measured constructs of the HBM among the intervention group. As many authors have noted that respondents who have been given a specific education are likely to give the expected responses not their true beliefs or practices.

Lost to follow up in follow-up studies is inevitable. Retention in this intervention study was 70%. Proper planning for handling data missingness as a result of LTFU should be clearly stated in intervention studies. It is however unclear how missing data was handled in this follow up study. The authors should have made an effort to classify the missing data to give readers an idea how missingness could have affected or not affected the results of the study.

It was interesting to note that after the fifth session the perceived severity was lower than the recorded fourth perceived severity, this brings the complexities in human behavior and it underscores the need to use more than one behavior model in an intervention. To reinforce desired behavior. It is not hard to imagine that as time goes by the women would revert to previous behaviors that increase exposure to ETS. A model that would explain this trend is the stage of change model. Where behavior moves in a circular pattern from pre contemplation → Contemplation → Determination → Action → Maintenance → Relapse then contemplation again.

Conclusion

The methodological design and findings of this study are remarkable; however more innovative approaches could have been used to make the results more credible. Installing the constructs of the HBM to influence behavior works but sustaining that behavior change needs a multi-facet approach.