

Activating Patients for Smoking Cessation Through Physician Autonomy Support

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OBJECTIVE. Test whether physicians' counseling patients for smoking cessation with an autonomy supportive rather than controlling style would increase patients' active involvement in the counseling session and increase maintained abstinence.

DESIGN. Randomized trial of 27 community-based physicians using two interview styles, with observer ratings of patient active involvement and assessments of patient smoking status at 6 months, 12 months, and 30 months.

PATIENTS. Adult smokers: 336 recruited; 249 for final analyses.

INTERVENTION. Physicians used an autonomy-supportive or controlling interpersonal style, randomly assigned within physician, to briefly counsel patients about smoking cessation, using the National Cancer Institute's 4-A's model.

MEASUREMENT. Patient active involvement was rated from audio tapes of the interviews. Continuous abstinence came from self-reports at 6 months, 12 months, and 30 months, CO validated at 6 months or 12 months and at 30 months.

RESULTS. Physician style did not have a significant direct effect on smoking cessation but did significantly increase patient active involvement in the interview. Active involvement, in turn, increased smoking cessation. Structural equation modeling confirmed a theoretical model in which the intervention positively predicted patient active involvement after controlling for patient reports of wanting to stop smoking, and active involvement significantly predicted continuous abstinence after controlling for previous quit attempts.

CONCLUSIONS. Although physicians' autonomy-supportive style while counseling smokers to quit did not have a direct effect on smoking cessation, it increased patients' active involvement in the counseling session which in turn increased continuous abstinence over 30 months. Further research should clarify the direct effects of physician interpersonal style on health outcomes.

Key words: Physician counseling; tobacco dependence; autonomy support. (Med Care 2001;39:813-823)

Tobacco use is the largest, single avoidable cause of illness and death in the US, responsible for more than 400,000 deaths per year.¹ Overwhelming evidence indicates that smoking-cessation interventions by physicians increase rates of smoking cessation,² and, although the increased quit rates are modest, the resulting

overall decrease in disease burden is substantial.³ Because a quarter of all Americans smoke regularly and half of all long-term smokers die from smoking-related diseases, the Agency For Health Care Policy and Research (AHCPR) has strongly advised physicians to systematically counsel smokers to quit by using a model introduced by

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the National Cancer Institute (NCI) called the 4-A's (Ask about smoking, Advise to quit, Assist by negotiating a quit date, and Arrange follow up). In a series of trials funded by the NCI, physicians who used the 4-A's model significantly increased quit rates.⁴

The initial 4-A's model did not address physician interpersonal style,⁵ so the current study examined whether the interpersonal style physicians use to implement the model influences patients' active involvement in the counseling session and, in turn, their long-term cessation. This question arose when attempting to integrate research results on patient activation⁶ and self-determination theory.⁷

Kaplan, Greenfield, and Ware⁶ developed an approach called patient activation, which aims to facilitate patients' active involvement in their physician visit by having an assistant meet with patients just before the visit to review their medical charts and encourage them to ask questions during the visit. Ratings of patient behavior from audio tapes of the visits indicated that patients given the activation intervention were more actively involved in the subsequent discussions than were patients given a standard education session. *Activation* is thus an intervention performed by medical assistants,⁶ and *active involvement* is a continuous variable describing the patients' behavior during the doctor visit. Kaplan, Greenfield, and Ware⁶ found that patients who had received the activation intervention and were more actively involved evidenced significantly better health outcomes (eg, lowered HbA1c for patients with diabetes) than nonactivated patients.

Research guided by self-determination theory^{5,7} found that when health care providers' supported patients' autonomy, which involves listening carefully to the patients' perspectives, encouraging questions, providing relevant information, offering choice about treatment regimens, supporting patient initiatives, and minimizing control, the patients were more autonomously motivated and behaved in healthier ways.^{5,8,9} These findings included maintained weight loss for morbidly obese patients,¹⁰ HbA1c reduction for patients with diabetes,¹¹ and medication adherence for adult outpatients.¹² An autonomy-supportive style contrasts with a controlling style which is more authority-based and pressuring of patients.

Autonomous motivation refers to patients' motivation for healthy behaving, whereas active involvement refers to patients' behavior during their

physician visit. We now hypothesize that if physicians use an autonomy-supportive style with patients, the patients will be more actively involved in the interaction and will evidence improved health outcomes. Thus, we propose that physicians using an autonomy-supportive style for brief smoking-cessation counseling could affect patients' active involvement and maintained cessation, in a way that parallels having an assistant activate patients before the visit.⁶ If it does, physicians could be taught to use a more autonomy-supportive¹³ style.

Method

Participants

Participants were 336 adult smokers recruited primarily by signs in doctors' offices and suggestions from participating physicians. Participants were adults who smoked at least five cigarettes a day and were willing to "discuss your smoking with a doctor, so we might learn more about how best to counsel patients who smoke." Individuals were encouraged to participate whether they wanted to quit smoking. Those who agreed were scheduled for a meeting to provide informed consent and complete a questionnaire. They were informed that participation involved having an audio-taped doctor visit to discuss smoking and completing a questionnaire 6 months and 12 months later. They were told that if they stopped smoking during the year, they would be asked to take a carbon monoxide breath test. A 30-month follow up was added subsequently, so patients were again contacted and asked if they would consent to an additional brief questionnaire and a carbon monoxide breath test if they had quit smoking. Participants were given a \$5 honorarium for each of four questionnaires they completed and a \$10 honorarium for each of two breath tests if they had quit. Their parking fees were also paid.

Of the 336 participants who took the first questionnaire, 316 agreed to attend the doctor visit and were randomized to condition. The 316 constituted the sample for the "intention-to-treat" analysis. Usable audio tapes of the doctor visit were available for only 301 of the 316, and 52 of the 301 did not provide 6-month smoking-status data, dropping the number to 249 as the final sample who had provided complete data at 6 months. These 249 participants constituted the

sample for the "as treated" analyses. Four of the patients in this final sample reported that they were not smoking at 6 months but had CO results that failed to confirm the self-reports. In keeping with standard practice in smoking-cessation research, these patients were classified as smokers at 6 months. From the full sample of 336, the 87 participants for whom we did not have complete data at 6 months were considered dropouts and were compared with the 249 final-sample patients on demographic and addiction variables.

Follow-up smoking status was obtained at 12 months and 30 months. Of the 249 in the final sample, actual smoking status was obtained from 203 at 12 months and from 189 at 30 months. Participants who did not provide actual smoking status at one or both follow-ups were considered smokers, so analyses on the 12-month and 30-month data were also conducted with the 249 participants.

Physicians

Twenty-seven primary care physicians administered the intervention without knowing the study hypotheses or how the audio tapes would be used. Eighteen were male, nine were female, and most were community practitioners affiliated with a university medical center. The physicians had familiarity with psychosocial medicine, but most had not had prior training in smoking-cessation counseling. Physicians attended a 3-hour training to learn how to administer the 4-A's model and how to use it with an autonomy-supportive style versus a controlling style. During the training, general information on smoking and smoking cessation was reviewed, a 30-minute videotape was played demonstrating the two styles of smoking-cessation counseling and the physicians' role played in each style, and physicians were given feedback. Physicians received a \$50 honorarium for participating and were asked not to tell patients that two intervention styles were being used. Doctors and patients were sent a debriefing letter at the end of the study.

Participants saw their own physician for the intervention if their physician was participating. If not, the patients were assigned to a participating physician who did the counseling without reimbursement. Of the patients, 24.8% did not see their primary doctor, and this percentage did not

differ across intervention conditions. Although it is likely that the 27 doctors differed in the degree to which they were autonomy supportive with patients, the randomization procedure ensured that each doctor had virtually the same number of patients who were counseled with his or her version of each style. Thus, individual doctor effects were controlled for across the two intervention conditions.

Randomization

After participants completed the initial questionnaire, they were randomized to intervention condition if they agreed to a physician appointment. These were the 316 participants in the intention-to-treat analysis. Just before a patient enters the office, the physician opened a sealed packet containing a blank audio tape, a statement indicating which style to use (randomly assigned), and a short outline of the key points of the 4-A's model used in that style.

Interventions

Physicians followed the 4-A's model in both conditions. Most interviews lasted between 8 minutes and 12 minutes, with an average of 11 minutes. In the autonomy-supportive condition, doctors applied the model from the patients' perspective supporting and encouraging them to make their own informed decision about whether to quit. In the controlling condition, doctors applied the model from their own perspective pressuring the patients to quit and telling them how to do it. We briefly consider each.

Autonomy-supportive Condition. In the *Ask* phase, physicians asked the patients how much and how long they had smoked, what they liked about smoking, what health concerns they had about smoking, whether they had tried to quit, and if so what had happened.

In the *Advise* phase, physicians advised patients that quitting smoking was important for their long-term health. The advice was given clearly, but not in a pressuring way, and the doctors acknowledged that stopping smoking was the patients' own decision. Importantly, doctors asked patients how they felt about what had been said.

In the *Assist* phase, physicians asked patients if they were ready to quit and, if not, what would

have to happen for them to be ready. For patients ready to quit, physicians asked if they were willing to set a quit date within 4 weeks. If yes, doctors encouraged them to think about the best time to quit and to actually set the quit date. Doctors offered the NCI booklet "Clearing The Air," saying "Here is a booklet that you might find helpful." Physicians informed patients that nicotine replacement (patch or gum) was available and recommended it for patients without contraindications, pointing out that use of the medication was their choice.

For patients who said they were not ready to quit or to set a quit date, doctors simply acknowledged the patients' lack of readiness and encouraged them to give it further consideration. They were offered the NCI booklet "Why Do I Smoke," which was designed for people not ready to quit.

In the *Arrange* phase, physicians suggested two follow-up contacts for patients who committed to quit, one during the first 2 weeks after the quit date and the second approximately a month after that. Phone contacts were arranged if office visits were not feasible.

Controlling Condition. In the *Ask* phase, physicians elaborated the health risks, rather than eliciting discussion about them, and there was no mention of the benefits of smoking. In the *Advise* phase, physicians were forceful in advising the patients to stop smoking because smoking is injurious to their health, and there was no acknowledgment that quitting was the patients' choice. In the *Assist* phase, patients were told that they should set a quit date within 4 weeks. Those who did were told to read "Clearing The Air," and those who did not were told they should read "Why Do I Smoke?" Physicians prescribed nicotine replacement for patients without contraindications stating that it would help them quit. Finally, in the *Arrange* phase, patients who set a quit date were told to make two follow-up appointments (or phone calls if visits were not feasible).

Questionnaires and Tape Ratings

Before the physician visit, participants completed a baseline questionnaire that included age, gender, marital status, race, household income, education level, number of previous quit attempts, number of cigarettes smoked per day, number of pack years, the Fagerstrom¹⁴ addiction severity

scale, and a scale from the original NCI studies^{15,16} that asks "how much do you want to stop smoking?"

Audio tapes were rated by three raters who underwent 15 hours of training but were blind to the study design and hypotheses. They did not know that there were two conditions involving doctors' using two different styles. Raters first judged physicians' autonomy support with 15 items from the Health-Care Climate Questionnaire.^{10,11} This was used to confirm that physicians were actually more autonomy supportive with the patients in the autonomy-support condition. Raters subsequently responded to 3 items on 5-point scales regarding the intervening variable of patient active involvement. Cronbach alphas across the three raters were 0.81 for autonomy support and 0.74 for active involvement.

An additional tape coder listened to a random sample of 168 tapes and coded whether each of the 4-As had been performed within each interview.

Outcome Measures

Point prevalences were determined for smoking cessation at 6 months, 12 months, and 30 months. The first time a patient said no, at either 6 months or 12 months, the answer was validated with a CO test of less than 10 ppm. All participants who reported not smoking at 30 months were also given a CO test. Continuous abstinence, which indicates that a patient had been abstinent at all three times, is the most important outcome for patients' risk reduction. The other two outcome variables were the number of days since patients' last cigarette, and the longest number of days they had been off cigarettes since the intervention interview. Patients who did not provide smoking status at 12 months or 30 months were considered to have had no days of abstinence since the previous assessment.

Analyses

In addition to preliminary analyses, the hypothesized theoretical model was tested using structural equation modeling (SEM), with LISREL.¹⁷ This was conducted four times, once each for the three assessments (6 months, 12 months, and 30 months) and once for continuous abstinence. LIS-

REL is ideal for testing path models because it examines the overall fit of the full-hypothesized model, which traditional analyses can not do.

LISREL first tests the measurement model with confirmatory factor analysis to assess the relation between latent variables and their indicators, and it then tests the fit of the hypothesized structural model by examining the relations among the latent and observed variables.¹⁸ Maximum likelihood estimation generated the standardized parameter estimates,¹⁹ and the fit of the models to the observed data were determined with the χ^2 statistic,²⁰ the nonnormed fit index (NNFI),²¹ and the root mean squared error of approximation (RMSEA).²² A χ^2 that is not significant (ie, $P > 0.05$) is optimal because it indicates that the model does not differ significantly from the data.²⁰ An NNFI above 0.90 and an RMSEA of less than 0.08 indicate a good fit.^{20,23}

Results

Dropouts Versus Completers

Of the 336 who completed the first questionnaire, 249 (74.1%) attended an audio-taped office visit and provided 6-month follow-up data. Comparisons between the dropouts and completers appear in the first three columns of Table 1. Dropouts were significantly younger, had marginally less household income, had made fewer previous quit attempts, and had marginally fewer pack-years of smoking.

For the 316 participants who were randomized to condition, 53% of dropouts were in the autonomy-supportive condition and 49% of completers were in that condition. χ^2 analyses revealed no significant difference, indicating that the dropout rate was not affected by the intervention condition to which participants had been randomly assigned.

Fidelity

Mean rated autonomy support in the autonomy supportive condition was 77.2, which was highly significantly greater than the mean of 58.1 in the controlling condition ($t = 11.8$, $df = 240$, $P = 0.00$) confirming that physicians behaved differently as a function of intervention status.

We used t -tests to determine whether the use of each of the four As was comparable in the two intervention conditions. There were no significant differences in the percentages of interviews in the two conditions that included ask, assist, or arrange. However, there was a marginally significant difference for advice, such that 98% of the controlling interviews included an explicit advice statement, whereas only 90% of the autonomy-supportive interviews included the advice statement [$t^{164} = 1.93$, $P = 0.06$].

Intention-to-Treat Analysis

In examining the effect of the intervention for the 316 patients who had been randomized to condition, 67 patients who did not provide 6-month cessation data were considered smokers. χ^2 analyses indicated that at 6 months $\chi^2 = 2.00$, $df = 1$, $P = 0.15$; at 12 months $\chi^2 = 0.12$, $df = 1$, $P = 0.73$; at 30 months $\chi^2 = 0.17$, $df = 1$, $P = 0.68$; and for continuous quit, $\chi^2 = 2.00$, $df = 1$, $P = 0.15$. Thus, the intervention did not have an effect on cessation when considering all patients who were randomized to condition.

Effects of the RCT for Completers

The final sample of 249 validated completers was used to test the study hypotheses. The fourth and fifth columns of Table 1 present the data for each intervention group, and the final column shows the significance level for the comparison of the two groups. There were no significant differences between the two groups on any of the demographic, severity, or initial motivation variables (the only marginal effect was for gender) thus indicating that the randomization was effective.

Before testing the study hypotheses, we examined quit rates for the full sample, collapsed across intervention conditions. They were: at 6 months, 25 patients (10.0%) were not smoking; at 12 months, 29 patients (11.6%); at 30 months, 48 patients (19.3%); and 18 (7.2%) were not smoking at all three points in time. These quit rates, which are consistent with those of the original NCI studies of the 4-A's model,⁴ compare favorably with the rate of approximately 2.5% per year when individuals quit on their own.

TABLE 1. Means or Percentages for Study Variables for Dropouts ($n = 87$), for the Final Sample of Completers ($n = 249$), for the Autonomy-Support Group ($n = 121$), and for the Controlling Group ($n = 128$). The third Column is the Significance Level for Dropouts vs. Completers, and the sixth column is the Significance Level for Autonomy Support vs. Controlling

	Dropouts	Completers	<i>P</i>	Autonomy Support	Controlling	<i>P</i>
Age (years)	37.2	43.0	0.00*	43.2	43.1	0.98
Gender (% female)	60.5%	62.1%	0.77	56.2%	67.7%	0.06
% Married or living together	50.0%	55.3%	0.38	56.7%	54.0%	0.67
Race (% not Caucasian)	23.3%	17.1%	0.21	16.7%	17.6%	0.85
Income (1-9)	4.8	5.3	0.08	5.2	5.5	0.27
Education (1-6)	3.7	3.8	0.82	3.7	3.8	0.57
Previous quit attempts	2.1	3.2	0.03*	3.0	3.5	0.60
Cigarettes per day	21.3	22.2	0.51	21.0	23.4	0.18
Addiction severity (0-11)	6.1	6.1	0.99	6.2	6.0	0.45
Pack years	23.1	28.2	0.10	27.3	29.0	0.58
Want to stop (1-10)	7.8	7.4	0.37	7.5	7.6	0.83
Rated active involvement		3.2		3.3	3.1	0.03*
Cessation (6 months) [†]		10.0%		7.4%	12.5%	0.18
Cessation (12 months) [†]		11.6%		10.7%	12.5%	0.67
Cessation (30 months) [†]		19.3%		18.2%	20.3%	0.67
Since last cigarette (6 months)		14.7		11.3	18.0	0.25
Days not smoking (6 months)		24.7		23.1	26.3	0.60
Since last cigarette (12 months)		48.1		41.0	54.8	0.47
Days not smoking (12 months)		45.3		41.6	48.8	0.56
Since last cigarette (30 months)		87.2		67.8	105.5	0.21
Days not smoking (30 months)		103.0		99.6	106.3	0.82
Continuous quit [‡]		7.2%		5.0%	9.4%	0.18

Notes. Comparisons are done with *t*-tests for continuous variables and with chi-square for percentages.

*Highlights that the comparison is significant.

[†]point prevalence, CO validated.

[‡]reported quit at 6, 12, and 30 months, CO validated at 6 months and at 30 months

Next, we examined the effects of using the 4-A's model with different interpersonal styles. Table 2 presents the numbers of people who quit and who did not quit at each assessment point and for continuous abstinence as a function of the communication style used by physicians to administer the 4-A's treatment. At 6 months $\chi^2 = 1.80$, $df = 1$, $P = 0.18$; at 12 months $\chi^2 = 0.21$, $df = 1$, $P = 0.65$; at 30 months $\chi^2 = 0.21$, $df = 1$, $P = 0.65$; and for continuous quit, $\chi^2 = 1.86$, $df = 1$, $P = 0.17$. Thus, the interpersonal-styles intervention did not have a direct effect on quit rates.

However, Table 1 showed that the intervention did have a direct effect on the hypothesized intervening variable of active involvement. Active involvement for these analyses was the mean of

nine ratings (three ratings by three raters), on a 1 to 5 scale. The mean of 3.3 ($sd = 0.84$) for the autonomy-support group was significantly greater than that of 3.1 ($sd = 0.82$) for the controlling group [$t^{247} = 2.17$, $P = 0.03$].

We then considered the relation of active involvement to smoking cessation using the 6-month data. The mean increase in quit rate as a function of a unit change in active involvement was 3.92% across the range of the active-involvement scale. Thus, patients being one unit more actively involved in the interview increased quit rates by nearly 4%.

In formulating the actual model to be tested, we examined the relation between all baseline variables and both active involvement and cessation.

TABLE 2. As Treated Analysis Showing Numbers of Patients from Each Intervention Condition Who Were Smokers and Nonsmokers at Six, Twelve, And Thirty Months, and Who Evidenced Continuous Nonsmoking Over the Thirty Months (n = 249)

		Autonomy Supportive	Controlling
Nonsmokers	6 months	9	16
	12 months	13	16
	30 months	22	26
	Continuous	6	12
Smokers	6 months	112	112
	12 months	108	112
	30 months	99	102
	Continuous	115	116

Note. χ^2 values and significance levels appear in the text.

Any variable that related to either active involvement or cessation was added to the theoretical model. First, we examined correlations among continuous study variables which appear in Table 3. Three variables—the number of previous quit attempts, want to quit, and active involvement—correlated significantly with cessation at 6 months and became progressively weaker over time. Also, education correlated with rated active involvement. Accordingly, previous quit attempts, want to quit, and education were added to the hypothesized structural model for the LISREL analyses.

Finally, we examined whether any of these relations were affected by gender. First, we inspected the correlations between gender and active involvement, cessation, want-to-quit, previous quit attempts, and education. None of these results approached significance. Second, we examined separate correlation matrices for men and women. The only gender differences were between the number of previous quit attempts and

TABLE 3. Correlations Among Continuous Study Variables (n = 249)

	B	C	D	E	F	G	H	I	J	K	L	M	N	O
A Age	0.02	-0.13 [†]	0.01	0.20 [‡]	0.04	0.54 [§]	0.03	0.02	0.01	0.04	0.05	0.06	0.13 [†]	0.11*
B Income	—	0.34 [§]	0.01	-0.11*	-0.18 [‡]	-0.10	0.04	0.12*	0.02	0.01	0.01	0.02	0.03	0.03
C Education	—	—	0.08	-0.19 [‡]	-0.16 [‡]	-0.22 [§]	0.08	0.14*	0.06	0.05	0.06	0.03	0.06	0.07
D Previous quit attempts	—	—	—	0.07	0.04	0.05	0.17 [‡]	0.11*	0.21 [§]	0.24 [§]	0.12+	0.07	0.09	0.04
E Cigarettes per day	—	—	—	—	0.49 [§]	0.82 [§]	0.06	-0.01	0.00	0.03	-0.05	0.00	0.00	0.04
F Addiction severity	—	—	—	—	—	0.42 [§]	-0.06	-0.01	-0.12*	-0.10	-0.17	-0.10	-0.10	-0.06
G Pack years	—	—	—	—	—	—	0.01	-0.02	-0.02	0.02	-0.04	0.01	0.05	0.07
H Want to stop	—	—	—	—	—	—	—	0.41 [§]	0.16 [‡]	0.12+	0.14	0.11*	0.11*	0.07
I Rated active involvement	—	—	—	—	—	—	—	—	0.26 [§]	0.17 [‡]	0.21 [§]	0.16 [‡]	0.13 [†]	0.10*
J Longest number of days not smoking (6 months)	—	—	—	—	—	—	—	—	—	0.87 [§]	0.82 [§]	0.78 [§]	0.69 [§]	0.61 [§]
K Days since last cigarette (6 months)	—	—	—	—	—	—	—	—	—	—	0.79 [§]	0.90 [§]	0.74 [§]	0.68 [§]
L Longest number of days not smoking (12 months)—	—	—	—	—	—	—	—	—	—	—	—	0.80 [§]	0.71 [§]	0.57 [§]
M Days since last cigarette (12 months)	—	—	—	—	—	—	—	—	—	—	—	—	0.80 [§]	0.73 [§]
N Longest number of days not smoking (30 months)	—	—	—	—	—	—	—	—	—	—	—	—	—	0.88 [§]
O Days since last cigarette (30 months)	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Note. Some values are based on slightly fewer patients than in the full sample because of missing data. * $P < 0.10$, [†] $P < 0.05$, [‡] $P < 0.01$, [§] $P < 0.001$.

the cessation variables of longest number of days not smoking at 6 months and 30 months and the number of days since last cigarette at 6 months, 12 months, and 30 months. For women, number of previous quit attempts was significantly related with these cessation variables, with correlation coefficients ranging from $r = 0.23$ to $r = 0.39$; whereas for men, none of these relations approached significance. However, we found that the three individuals with the greatest number of quit attempts were all women, who had 99, 50, and 25 previous attempts, compared with an average of 3.2 quit attempts for all participants, and all three of these outliers had quit smoking at 6 months. When the outliers were removed, all correlations for the women between previous quit attempts and the cessation variables dropped to nonsignificance, and did not differ from those of the men. Thus, the two analyses together indicate that the hypothesized relations among the variables of the model were not meaningfully affected by gender.

Estimation of the Structural Equation Models

The latent variable "rated active involvement" was constructed by averaging across the three raters within each of the three items and using the three item means as the indicators of the latent variable. The latent variable "not smoking" was formed for each test of the model from three indicators: the relevant validated 7-day point prevalence; the number of days immediately before the assessment that patients reported having not smoked; and the longest number of consecutive days they had not smoked since the intervention visit.

First, the measurement model was tested using initial questionnaire and tape-rating data and 6-month cessation data. Confirmatory factor analysis revealed that the indicators related well to their latent variables. Although the χ^2 was significant [χ^2 (df = 8, n = 249) = 17.6, $P = 0.03$], the fit indices suggested a good fit, NNFI = 0.99, RMSEA = 0.07.

The structural model was then tested four times, for 6-month cessation, 12-month cessation, 30-month cessation, and continuous abstinence. Every path was significant at 6 months except for the path from education to active involvement (parameter estimate = 0.08, $P = 0.14$). Because education was unrelated to either active involve-

ment or cessation, it was trimmed from the final model. The standardized parameter estimates for the linkages in the model for the 4 tests appear in Table 4, and those for continuous abstinence also appear in Fig. 1. The three independent variables in rectangles are observed variables, whereas those in ovals are latent variables formed from the indicators in the small boxes to which they point. The parameter estimates convey the strength of relations between two variables in the model, and when standardized are comparable to beta weights from regression analyses.

The models fit the data well, as shown in Table 4 by the RMSEA and NNFI for each model. For continuous abstinence, as hypothesized, the intervention significantly predicted the patients' active involvement (parameter estimate = 0.11, $P = 0.05$), even after controlling for how much the patients wanted to stop smoking (parameter estimate = 0.48, $P = 0.00$). Rated active involvement in turn predicted patients' not smoking (parameter estimate = 0.15, $P = 0.02$), even after controlling for the number of previous quit attempts. The identical models, estimated for 6, 12, and 30 months, had parameter estimates similar to those for continuous abstinence. The only difference was that the path from previous quit attempts to cessation was significant in the 6-month model but not the other three models, although even that path was nonsignificant if the outliers for number of quit attempts were removed. In summary, the hypothesized theoretical model was supported in each analysis, even though the hypothesized direct effect of the intervention on cessation was not, thus indicating that, when doctors use the 4-A's model in an autonomy supportive manner, patients are more actively involved in the discussion and, in turn, are more likely to be nonsmokers.

Discussion

This study showed that, when primary care physicians use an autonomy-supportive (as opposed to controlling) style to administer the 4-A's model of smoking-cessation counseling, patients are more actively involved in the interview (as assessed by trained raters) and in turn show greater long-term smoking cessation than when physicians use a controlling style. However, the physicians' counseling style did not directly affect cessation. The study adds to the literature by showing that physicians' use of an autonomy-supportive style can activate patients

TABLE 4. Path Coefficients (i.e., parameter estimates) for each Hypothesized Path in the Structural Equation Models at 6, 12, and 30 Months and for Continuous Abstinence (df = 23, n = 249), along with the Indices of Fit for Each Full Model

Model	Parameter Estimates				Indices of Model Fit			
	Intervention to Active Involvement	Want to Stop to Active Involvement	Active Involvement to Not Smoking	Previous Quit Attempts to Not Smoking	χ^2	P for χ^2	RMSEA	NNFI
6 months	0.11*	0.48‡	0.17*	0.22‡	59.1	0.00	0.07	0.97
12 months	0.11*	0.48‡	0.20†	0.06	45.1	0.00	0.06	0.97
30 months	0.11*	0.48‡	0.14*	0.05	60.2	0.00	0.07	0.95
Continuous abstinence	0.11*	0.48‡	0.15*	0.05	54.6	0.00	0.07	0.96

* $P < 0.05$, † $P < 0.01$, ‡ $P < 0.001$.

to become more involved in discussions of their health care, leading to improved, long-term health outcomes.

One possible reason there were not direct effects on cessation is that each doctor used both styles (with different patients) after only 3 hours of training in the different counseling styles. Using

the same doctors in both conditions was a strength of the study for experimental control, but it likely diminished the salience of the two styles and thus weakened the power of the intervention. This weakened effect may have been particularly so for the 75% of the patients who saw their own doctors because those patients would have had

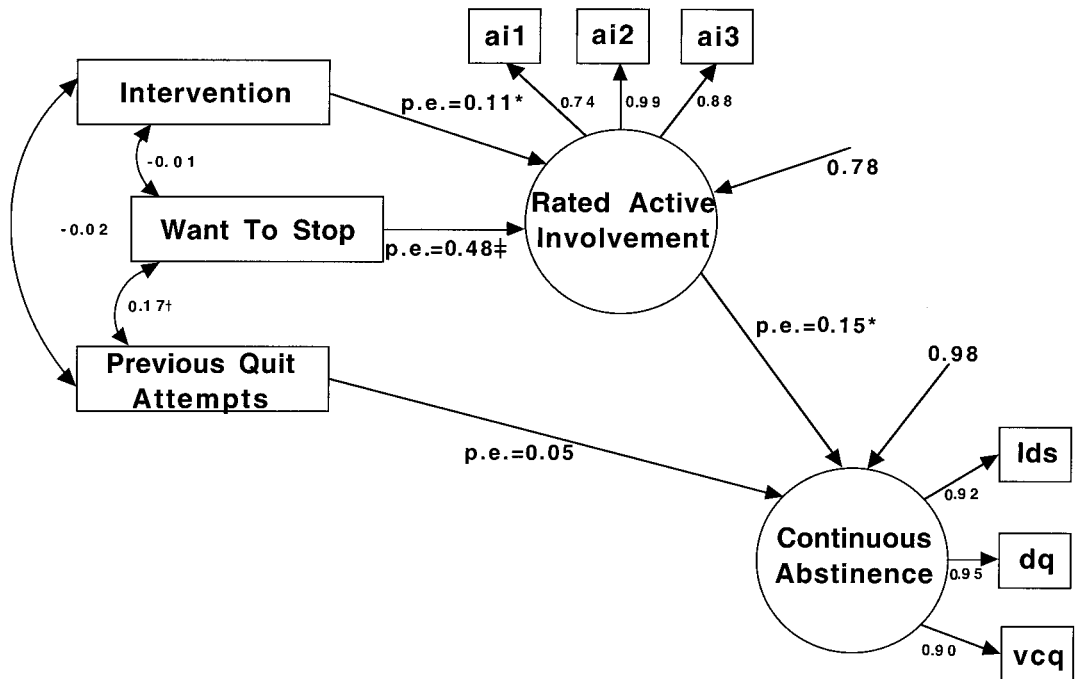


FIG. 1. Model of facilitating active involvement and continuous abstinence by physician autonomy support. Notes. Rectangles represent observed variables and circles represent latent variables. ai = active involvement, lds = longest number of days not smoking, dq = number of days quit, vcq = validated continuous quit, p.e. = parameter estimate. * $P < 0.05$, † $P < 0.01$, ‡ $P < 0.001$. χ^2 [23, N = 249] = 54.6, $P < 0.05$; RMSEA = 0.07; NNFI = 0.96.

baseline expectations and could have assimilated a different style during the brief discussion. Future trials should examine these two intervention conditions performed in a way that makes the different styles more salient to patients.

Related to this point is the fact that, when doctors were in the autonomy-supportive condition, they were somewhat less likely to make an explicit advise statement (90% for autonomy supportive compared with 98% for controlling) and this may have weakened the autonomy-supportive intervention. Perhaps making an explicit advise statement felt controlling to some of the doctors so they tended to shy away from it in the autonomy-supportive condition.

Another possible account of the lack of direct effects is that there were competing processes operating. Control may prompt short-term behavior change, whereas autonomy support, which facilitates patients' taking more responsibility for their own health, may take longer to promote change but that change may be better maintained. If so, direct, positive effects of physicians' autonomy support on cessation would require additional contacts, particularly for patients who are not effective at self-regulation. In fact, for smoking cessation, it may be especially important to be autonomy supportive when patients have relapsed.

Although the direct effects of patient autonomy support on smoking cessation remain unclear, we nonetheless advocate its use based on correlational evidence reviewed herein,^{10,11,12} on the AH-CPR smoking-cessation meta-analysis² which showed the importance of intratreatment social support (a concept similar to autonomy support), on the recent PHS tobacco-dependence guidelines²⁴ which explicitly mention patient autonomy, and on medical ethics which also endorse the concept.²⁵ Clearly, the issue is an important one that deserves additional research.

Inclusion of participants who did not want to quit smoking and use of community-based primary care offices as study sites improve generalizability of the results, but the self-selected sample represents a limitation. Loss of participants in follow-up assessments is also a limitation.

In conclusion, use of the 4-A's model has been shown effective for promoting smoking cessation. The current study indicates that physicians' use of the 4-As with an autonomy supportive style, which means eliciting the patients' perspective, identifying their concerns about smoking, sup-

porting their initiatives to change, providing clear though nonpressuring advice regarding health improvement, and minimizing controls during the interview, will encourage patients to become more active in the discussion and in turn will yield improved continuous abstinence over 30 months. Further research is needed to isolate direct effects of physicians' interpersonal styles on patients' maintained behavior change.

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