

Partner Behaviors That Support Quitting Smoking

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One month after their quit date, 221 Ss completed a shortened Partner Interaction Questionnaire (PIQ) in which they reported the frequency of 10 positive and 10 negative behaviors performed by a spouse or romantic partner in response to their quitting attempt. A subset, using the same instrument, reported expectations of support prior to quitting. The ratio of received positive/negative behaviors was a consistently better predictor of abstinence than were the frequencies of either positive or negative behavior alone, with higher ratios associated with abstinence. In addition, partners were less interactive than expected but performed more positive behaviors than expected. The overall pattern of results suggests that the context of a relationship mediates the impact of specific supportive or nonsupportive behaviors. Psychometrics for the 20-item PIQ are presented.

A number of studies have found that persons whose partners reportedly supported their efforts to quit smoking were more likely to quit smoking and maintain abstinence (e.g., Cohen et al., 1988; Coppotelli & Orleans, 1985; Mermelstein, Cohen, Lichtenstein, Baer, & Kamarck, 1986; Ockene, Benfari, Nuttall, Hurwitz, & Ockene, 1982; West, Graham, Swanson, & Wilkinson, 1977). Less clear, however, is what kinds of partner behaviors are helpful to quitters and what kinds are harmful. This lack of information about mediating behaviors may be responsible, in part, for the ineffectiveness of interventions designed to facilitate spouse/partner support for quitting smoking (see recent reviews by Cohen et al., 1988, and Lichtenstein, Glasgow, & Abrams, 1986).

This study is concerned with identifying the nature of partner behaviors that actually support quitting and maintenance of abstinence. In addressing this question, we developed a short (20-item) version of the Partner Interaction Questionnaire (PIQ-20) that includes separate subscales assessing positive and negative behaviors provided by a spouse or romantic partner, close friend, or family member. (The original 76-item PIQ is documented in Mermelstein, Lichtenstein, & McIntyre, 1983.) The

positive behaviors are characterized by cooperation and reinforcement for the quitting attempt, the negative behaviors by nagging and policing.

Several studies have provided suggestions regarding appropriate supportive behaviors. Mermelstein et al. (1983) found that partners' performance of positive behaviors, such as those expressing cooperation-participation and reinforcement for the quitting attempt, were associated with abstinence 1, 3, and 6 months posttreatment. Negative behaviors, such as nagging, shunning, and policing, did not significantly influence outcome. Similar evidence was reported by Coppotelli and Orleans (1985), who found that those reporting positive partner behaviors were more likely to maintain abstinence during the 6- to 8-week period after quitting. In contrast, Morgan, Ashenberg, and Fisher (1988) found that 13-week abstainers reported more positive behaviors from friends throughout the maintenance period but no relations between reports of family or spouse behaviors and abstinence. Finally, in a retrospective study, Glasgow, Klesges, and O'Neill (1986) found that negative behaviors by a spouse were correlated with less abstinence but that positive behaviors were unrelated to outcome. In summary, spouse/partner interactions have been associated with quitting and with short to moderate periods of maintenance. However, the data are mixed, with some support for positive interactions, some for negative, and some for no influence of spouse or family.

The instruments used in the studies discussed earlier emphasize the frequency of positive and negative behaviors. It is possible, however, that the effectiveness of support may have more to do with a general feeling of partner supportiveness than with the frequency of each type of behavior. Because couples are likely to differ substantially in the base rate of behaviors relevant to quitting attempts, we hypothesized that an integration of positive and negative behaviors independent of behavior frequency might be a better predictor of smoking cessation and maintenance. We represent this integration by a ratio of positive/negative behaviors. In an additional attempt to tap the base rate of couples' behaviors relevant to the quitting process, we asked

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persons before they started to quit (at baseline) about the frequency of relevant behaviors they expected from their partners.

In this article, we present data from a 1-year longitudinal study of over 200 persons attempting to quit smoking on their own. Subjects were administered a measure of expected partner support before starting the quitting process and a measure of received partner support 1 month after their quit date. In both cases, partner support was measured by a new 20-item version of the PIQ that assessed whether partners performed each of 10 positive and 10 negative behaviors. We used 1-, 3-, 6-, and 12-month continuous abstinence data to address three questions: (a) What are the independent effects of partners' positive and negative behaviors on abstinence; (b) is the ratio of positive to negative behaviors as important or more important than the frequency of these behaviors; and (c) does the support one expects influence the effectiveness of the support one receives?

Method

Subjects

The subjects were 221 persons making a serious attempt to quit smoking by themselves. Eighty-nine of the subjects called the American Lung Association to request a self-quit manual, and the remaining 132 responded to newspaper and radio advertisements for persons planning to quit smoking by themselves. In order to qualify for participation, a subject was required to be 18 years or older, smoke at least 10 cigarettes a day, and have not yet begun the quitting process. The mean number of cigarettes smoked at baseline was 26.8 per day, and the mean duration of smoking was 23.3 years. Seventy percent of the subjects were women, and the mean age was 40. No data on racial or ethnic background were collected.

It was emphasized that the interviewers were interested only in the responses to the experience of quitting and could not provide any aid in the quitting process. Subjects were paid \$15 each for the baseline and 6-month interviews and \$5 for each of the 1-, 2-, 3-, and 12-month follow-ups. Those who completed all six interviews were eligible to win a videotape recorder in a drawing.

Interviews

Those meeting study criteria were given a baseline interview and follow-up interviews 1, 2, 3, 6, and 12 months after their expected quit dates.¹ The baseline interview included the PIQ (expected support), a smoking history questionnaire, and a number of other psychosocial and smoking characteristic measures (see reports by Cohen & Lichtenstein, in press, and Lichtenstein & Cohen, in press). The 1-month interview also included the PIQ (received support). All of the interviews included a detailed assessment of smoking status. All 221 persons were administered a measure of received partner support at 1 month, and the first 145 of the 221 were administered a measure of expected partner support at baseline. (The baseline PIQ was replaced with a questionnaire addressing another issue midstudy.) In order to assess the possible influence of the multiple interviews on abstinence rates, a *minimal-contact* control group of 74 subjects received only short (limited to smoking questions) prequit and 12-month interviews.

Biochemical Verification

At each interview, subjects were reminded that at some as yet unscheduled point of the study, the investigators would biochemically verify their smoking status. All persons who reported abstinence at 6 months were scheduled for verification with both carbon monoxide

(CO) and saliva cotinine. All persons continuously abstinent at 6 months were tested, and all had CO and cotinine levels consistent with their continuous abstinence status.

Smoking Status

Point-prevalence abstinence at each interview was assigned to persons who said that they were not currently smoking and had not smoked "even a puff" during the last week. *Continuous abstinence* was assigned to persons who were point-prevalent abstinent at all follow-up interviews up to the point of assessment (e.g., at 1 and 3 months for 3-month continuous abstinence) and had not smoked more than 3 days since quitting.

Scales

Partner Interaction Questionnaire. The PIQ inquires about the support for quitting provided by a spouse or living partner (Mermelstein et al., 1983). For our study, we developed a 20-item version of the PIQ that included 10 positive and 10 negative behaviors a partner might perform. The two subscales were derived from a factor analysis of the original scale data from two clinic studies. The 20 scale items are listed in the appendix. At baseline, before subjects started the quitting process, we asked for an indication of behaviors that were expected from partners. At the 1-month follow-up we asked for an indication of behaviors actually received from the partner. We asked persons to answer about their spouses or romantic partners if they had one. If not, they were asked to pick the person, friend or relative, who would follow their progress in quitting most closely. We also recorded their relationships to their partners.

For each item, subjects responded on a 5-point scale: *never* (0), *almost never* (1), *sometimes* (2), *fairly often* (3), and *very often* (4). Separate scores were calculated for positive and negative behaviors by summing responses to the 10-items within each subscale. Internal reliabilities (Cronbach alphas) for the expectancy PIQ were .89 for the positive scale and .82 for the negative scale. Internal reliabilities for the received PIQ were .89 for the positive scale and .85 for the negative scale. In creating the positive/negative ratio score, 19 subjects who reported 0 negative behaviors were assigned 1 negative behavior so that proportions could be calculated for them.

Smoking status of spouse/partner. At the baseline interview, subjects were asked which best describes the smoking status of their spouse or partner: *also smokes and is trying to quit; also smokes, isn't quitting; is an ex-smoker; has never smoked.*

Results

PIQ Mean Scores

Mean expected PIQ scores were based on the 145 persons who were administered the expected scale. The mean expected positive score was 28.70, the negative score was 17.35, and the positive/negative ratio was 2.60. The mean received PIQ scores were based on the 221 persons who were administered the received support scale. The mean received positive score was 19.63, the negative score was 12.39, and the ratio was 3.67. Men and women differed only on the ratios of positive/negative scores. Women both expected and received a larger ratio of positive to negative behaviors than men. The mean expected male ratio was 2.06, whereas the mean expected female ratio was

¹ Because only two persons relapsed between 2 and 3 months, 2-month abstinence was omitted from these analyses.

3.36, $t(194) = 2.95, p < .004$. Similarly, the mean received male ratio was 2.70, whereas the received female ratio was 4.08, $t(167) = 2.03, p < .04$; t tests were done with separate variance estimates (Dixon, 1985).

Expected versus received support. In order to examine the relation between the support people expected and what they actually received, mean expected and received PIQ scores were calculated on the basis of the 145 persons receiving both scales. Hence means for received behaviors in these calculations were slightly different from those that were based on 221 subjects reported earlier. For both positive and negative behaviors, subjects received a lower frequency of behaviors than they expected. Mean positive behavior scores were 28.70 on the expected scale and 21.08 on the received scale, $t(144) = 9.04, p < .001$. Mean negative behavior scores were 17.35 on the expected scale and 13.07 on the received scale, $t(144) = 5.70, p < .001$. For the ratio of positive to negative behaviors, subjects had a higher received ratio (3.57) than they expected (2.60), $t(144) = 2.18, p < .03$. The correlations between expected and received scores were .41 ($df = 144, p < .001$) for positive behaviors, .45 ($df = 144, p < .001$) for negative behaviors, and .22 ($df = 144, p < .007$) for the positive/negative ratio.

Correlations between PIQ scores. Correlations between number of negative and number of positive behaviors indicated a moderate relation between these behavior frequencies both for expected ($r = .26, df = 144, p < .002$) and received ($r = .35, df = 221, p < .001$) scores. Neither expected nor received positive scores were correlated with their corresponding positive/negative ratio ($r = .07, df = 144$, and $r = .12, df = 221$, respectively). However, negative scores were negatively correlated with positive/negative ratios for both expected and received behaviors ($r = -.60, df = 144, p < .001$, and $r = -.53, df = 221, p < .001$, respectively). Hence the ratios were more influenced by the frequency of negative behaviors than by the frequency of positive behaviors.

Abstinence Rates

At 1 month, 10.4% of the sample (23/221) were continuously abstinent. There was relatively little change in the percentage of persons continuously abstinent at subsequent follow-ups, with only 12 relapsing between 1 and 12 months: 6.8% (15/219) abstinent at 3 months, 5.5% (12/218) at 6 months, and 5.0% (11/219) at 12 months; hence prospective lag prediction of relapse (e.g., predicting relapse from 1- to 3-month follow-ups) was not possible. These rates were consistent with those reported in other studies of self-quitters (e.g., median of 4.2% at 12 months for five studies reported by Cohen et al., 1989).

Of the 74 members of the control group receiving only prequit and 12-month interviews, 4 (5.4%) reported 12-month continuous abstinence. Hence the multiple-interview procedure did not influence (at least long term) abstinence rates.

Predicting Continuous Abstinence

Each of the primary outcome analyses is a logistic regression. The dichotomous variable *abstinent/smoking* is regressed on various combinations of PIQ scale scores. *Abstinence* is coded as 1 and *smoking* as 0. The probability values we report are

based on treating the regression coefficient divided by its standard error as a t value and using two-tailed tests (Dixon, 1985). In order to illustrate the nature of effects indicated by significant coefficients, we report percentage of abstinence for persons high (above the median) and low (below the median) on a variable. The regression statistics are based not on these data but rather on the continuous data from which the medians are derived.

We did separate analyses of continuous abstinence at 1, 3, 6, and 12 months postquit date. Analyses of the same variable at different panels are not independent (e.g., the people abstinent at 12 months were abstinent at all previous panels). The purpose of presenting data from each successive panel is to determine the predictive ability of the partner support in relation to an increasingly conservative outcome criterion.

The first set of equations was designed to test the independent influences of the frequencies of positive and negative received behaviors on abstinence. The second set was designed to test whether the ratio of positive/negative behaviors would predict continuous abstinence. Finally, we conducted a set of conservative analyses to determine whether associations between the ratio and outcomes occurred above and beyond the influence of positive and negative behavior frequencies. Because of the multiple tests, we used a conservative alpha of $p < .01$ to evaluate these hypotheses. Findings at the $p < .05$ level were viewed as suggestive but not conclusive.

Received Support

The percentage of persons continuously abstinent at each panel as a function of whether they were above or below the median of each PIQ score is presented in Table 1. Table 1 can be referred to for clarification of the nature of the effects described later. Table 2 reports the regression coefficients, standard errors, and probability levels for the various regression equations.

Independent effects of positive and negative behaviors. In a single equation (Equation 1 in Table 2), abstinence/smoking was regressed on the number of positive behaviors received (+ R) and the number of negative behaviors received (- R). As apparent from Table 2, the more positive behaviors the subject received, the more likely he or she was to be continuously abstinent at 1 month. A similar suggestive effect ($p < .05$) occurred at 3 months, but there were no relations between positive behaviors and abstinence at 6- and 12-month follow-ups. Also apparent from Table 2 is a suggestive ($p < .05$) association between negative behaviors and abstinence at 1 month. The more negative behaviors, the less likely subjects were to be continuously abstinent. There were no associations between frequency of negative behaviors and any of the subsequent follow-ups.

Proportion of positive to negative behaviors. A set of analyses was conducted to determine whether the ratio of positive to negative behaviors received (+ R /- R) predicted continuous abstinence. The first logistic regression (Equation 2 in Table 2) included only the ratio + R /- R . As apparent from Table 2, the ratio was associated with continuous abstinence at the 1-, 3-, 6-, and 12-month follow-ups. In all cases, the greater the proportion of positive to negative behaviors, the greater the abstinence rate. In order to determine whether the ratio accounted for variance in abstinence above and beyond that accounted for by + R

Table 1
Percentage of Persons Abstinent as a Function of Whether They Were Above or Below the Median on the Three Received PIQ Scores

Received support	1 month		3 months		6 months		12 months	
	Below	Above	Below	Above	Below	Above	Below	Above
Positive behaviors (+R)								
%	5.1	16.3	4.2	9.8	3.4	7.9	3.4	6.9
<i>n</i>	118	104	118	102	118	101	118	102
Negative behaviors (-R)								
%	12.5	8.3	8.1	5.6	7.2	3.7	6.3	3.7
<i>n</i>	112	109	111	108	111	107	111	108
Ratio (+R/-R)								
%	6.2	14.8	4.5	9.3	2.7	8.4	2.7	7.5
<i>n</i>	113	108	112	107	111	107	112	107

Note. PIQ = 20-item Partner Interaction Questionnaire.

and -R, a third regression was run including all three variables—+R, -R, and +R/-R—as predictors (Equation 3 in Table 2). As apparent from Table 2, even after partialing out the constituent parts of the ratio, there was a suggestive relation ($p < .05$) between the proportion +R/-R and continuous abstinence at 1, 6, and 12 months. The coefficient at 3 months was marginally significant ($p < .07$). Again, in all cases, the higher the frequency of positive relative to negative behaviors, the greater the probability of being abstinent. The positive behavior score was marginally predictive at 1 month ($p < .05$), but nei-

ther positive nor negative behavior coefficients were significant at any other time in equations in which the ratio was included.

Expected Support

Our concern with expected partner support was driven by an interest in the influence of expected support on the effectiveness of received support. Although there were indications of expectations influencing the effectiveness of received support, none of the critical analyses reached statistical significance. The most

Table 2
Regression Coefficients and Standard Errors for Analyses of Contributions of Positive Behaviors Received (+R), Negative Behaviors Received (-R), and the Ratio (+R/-R) for Each Abstinence Criterion

Variables in equation	Continuous abstinence criterion			
	1 month (<i>n</i> = 221)	3 months (<i>n</i> = 219)	6 months (<i>n</i> = 218)	12 months (<i>n</i> = 219)
Equation 1				
Positive behaviors (+R)				
Regression coefficient	.09**	.07*	.07	.06
SE	.029	.032	.036	.037
Negative behaviors (-R)				
Regression coefficient	-.07*	-.06	-.07	-.06
SE	.029	.034	.041	.041
Equation 2				
Ratio (+R/-R)				
Regression coefficient	.12***	.10**	.11***	.11**
SE	.031	.033	.035	.036
Equation 3				
Positive behaviors (+R)				
Regression coefficient	.06*	.04	.04	.03
SE	.031	.036	.040	.042
Negative behaviors (-R)				
Regression coefficient	-.01	-.01	-.01	.00
SE	.036	.042	.048	.048
Ratio (+R/-R)				
Regression coefficient	.10*	.09	.10*	.10*
SE	.043	.047	.051	.052

Note. Abstinence was coded as 1 and smoking as 0.
 * $p < .05$. ** $p < .01$. *** $p < .001$.

interesting distribution of proportions suggested that persons with higher positive to negative behavior ratios than they expected were more likely to be abstinent (e.g., 25% at 1 month, $N = 20$) than both those getting what they expected (9.1% abstinence for those expecting a low ratio, $N = 55$, and 12.0% for those expecting a high ratio, $N = 50$) and those with lower positive to negative behavior ratios than they expected (0%, $N = 20$). We attribute the lack of significant effects to the smaller sample size for persons receiving the expected PIQ at baseline. There were similarly no independent effects of expectation on abstinence.

Relation of PIQ to Partner Relationship and Gender

A series of analyses of variances were conducted in order to determine if any of the expected or received PIQ scores were related to whether the named partner was a spouse, the gender of the smoker, and the smoking status of the partner. There were no differences on any PIQ score on any of these criteria.

Discussion

As was reviewed earlier, existing work is inconsistent in regard to whether positive or negative spouse/partner behaviors are most important in influencing abstinence. Our data suggest that the ratio of positive/negative behaviors as perceived by the quitter is what is really important. The ratio predicted continuous abstinence through 12 months, and suggestive ($p < .05$) effects remained even after partialing out variance accounted for by the frequency of positive and negative behaviors. Positive behaviors alone predicted 1 month abstinence, whereas none of the associations between negative behaviors and abstinence reached the $p < .01$ criterion. Hence it appears that people get a general sense of support on the basis of the relative frequency of positive to negative behaviors, and this is what is associated with continuous success in quitting. These data suggest that both increasing positive and decreasing negative behaviors may facilitate quitting and maintenance and that even small changes in the frequencies of these behaviors may be important for couples with low base rates of interactions relevant to quitting.

Because there was relatively little change in the percentage of persons continuously abstinent at subsequent follow-ups (only 12 relapsing between 1 and 12 months) prospective lag predictions of relapse were not possible. Hence the analyses presented in this study are retrospective, and causal interpretations are not possible. Two considerations, however, suggest that partner support causing abstinence is a more likely interpretation: (a) There is previous evidence for prospective effects (e.g., Coppotelli & Orleans, 1985; Mermelstein et al., 1983; Morgan et al., 1988); and (b) some of the stronger predictors in this study continued to predict through 12 months, even though over 50% of persons abstinent at 1 month relapsed during that period.

Our attempt to evaluate received support in the context of expected support failed. However, analysis of the ratio data did suggest that such an approach might pay off with a larger sample size (only 145 were available for these analyses as opposed to 221 for the received support analyses). There were, however, some interesting data in regard to the relation between frequencies of the behaviors persons expected and what they actu-

ally received. In general, it appears that subjects' expectancies were reasonable but not particularly accurate. They received fewer positive and negative behaviors than expected and received a higher positive to negative ratio than expected. In short, their partners were less interactive in regard to their quitting than they expected, but relatively more of the interactions were positive in nature.

Self-reported behaviors. It is possible that self-reports of others' behaviors provide a biased reflection of how others actually behave. Because the items in the PIQ referred to very specific behaviors (e.g., "asked you to quit smoking" and "mentioned being bothered by smoke"), we expect that self-reported biases were minimized. However, further work on partner support for quitting smoking could benefit by the examination of scale validity through independent reporting of both partners' and independent judges' observations (possibly in laboratory settings) of behaviors relevant to quitting.

Too few quitters? The poor (from a clinical perspective) long-term continuous quit rates in this study may limit the potential implications of our findings for intervention. After all, only 7.5% of those with ratio scores above the median were continuously abstinent at 12 months. However, this study focused on only a single attempt to quit smoking. It is possible that increasing family members' ability and motivation to support quitting could pay off in later attempts; hence our results may underestimate the overall impact of partner support on smoking cessation (Cohen et al., 1989; Schachter, 1982).

The PIQ-20. Although it contained considerably fewer items and had an easier and shorter response format, the revised version of the PIQ used in this study provided both adequate reliability (for both expected and received support) and construct validity in terms of its success in predicting continuous abstinence over the course of the 12-month study. This scale was also somewhat broader than the original version in that persons without spouses or romantic partners were able to use it by identifying someone who would follow their progress in quitting. Analyses of the source of support (spouse or not, gender, and smoking status of the partner) failed to indicate any relation between source and PIQ scores. Finally, the scale had more direct implications for intervention than the original scale, because it used a response format that was based solely on the frequency of reported behaviors not including a weight for individual perceptions of helpfulness. Hence it was possible to conclude which objectively defined categories of behavior helped or hindered quitting and maintenance.

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Appendix

Items From the 20-Item Partner Interaction Questionnaire.^{A1}

Negative Behaviors

1. Asked you to quit smoking.
2. Comment that smoking is a dirty habit.
3. Talk you out of smoking a cigarette.
4. Comment on your lack of willpower.
5. Comment that the house smells of smoke.
6. Refuse to let you smoke in the house.
7. Mentioned being bothered by smoke.
8. Criticize your smoking.
9. Express doubt about your ability to quit/stay quit.
10. Refuse to clean up your cigarette butts.

Positive Behaviors

1. Compliment you on not smoking.
2. Congratulate you for your decision to quit smoking.

3. Help you think of substitutes for smoking.
4. Celebrate your quitting with you.
5. Help to calm you down when you are feeling stressed or irritable.
6. Tell you to stick with it.
7. Express confidence in your ability to quit/remain quit.
8. Help you to use substitutes for cigarettes.
9. Express pleasure at your efforts to quit.
10. Participate in an activity with you that keeps you from smoking (e.g., going for a walk instead of smoking).

^{A1} Positive and negative behaviors were mixed together in random order when presented to subjects.

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