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The Relation between Social Support and Smoking Cessation: Revisiting an Established Measure to Improve Prediction

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Abstract

Background—Although social support is an integral element in smoking cessation, the literature presents mixed findings regarding the type(s) of social support that are most helpful. The Partner Interaction Questionnaire (PIQ) is commonly used to measure social support in this context.

Purpose—We explored the possibility that more nuanced distinctions between items on the PIQ than what is customarily used could improve the prediction of cessation.

Methods—Baseline PIQ responses of smokers enrolled in a cessation program was submitted to an exploratory factor analysis. Emergent factors were used to predict cessation at several time points.

Results—Four factors emerged, which differed from the two subscales that are typically used. The four-factor version predicted cessation; the two-factor version did not.

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Conclusions—Identifying the types of social support that predict smoking cessation depend on our ability to measure social support. More nuanced measures will likely clarify the role of social support in cessation.

Keywords

Smoking Cessation; Social Support

Social support is considered as a key factor in the smoking cessation process. Seminal work in this area found that social support is particularly important during the initiation of the cessation process; smokers who perceived themselves as having more social support from their romantic partners were more likely to make a quit attempt and to remain quit after 3 months [1]. Subsequent efforts have sought to identify the specific *types* of social support that are most useful to smokers who are seeking to quit, but little clarity or consistency has emerged in the literature [see 2, 3]. At the same time, effective intervention strategies to enhance partner support for smokers have remained elusive [e.g., 4].

To date, research on social support in the domain of smoking cessation has focused on a few dichotomous distinctions, such as intratreatment versus extratreatment support, and positive versus negative social support [2, 5]. In this paper, we explore whether identifying and measuring finer distinctions between specific types of social support may reveal dimensions that are particularly helpful during the cessation process.

Measuring Social Support in the Context of Smoking Cessation

Social support is typically defined as “the social resources that persons perceive to be available or that are actually provided to them by nonprofessionals in the context of both formal support groups and informal helping relationships” [6, p. 4]. This definition is quite broad and a number of theoretical frameworks distinguish between several types of social support. For instance, instrumental support involves offering material resources or direct aid; emotional support involves providing empathetic, caring, and reassuring communication; and informational support entails offering advice or information [7, 8].

Efforts to identify the degree to which specific types of social support predict smoking cessation depend critically on our ability to measure social support. Within the context of smoking cessation, social support is most often measured by the Partner Interaction Questionnaire [PIQ; 5, 9; see 4, 10]. The PIQ asks smokers how frequently they expect their partners to perform various behaviors that relate to smoking cessation. The PIQ was developed as a 76-item scale [9], but later shortened to the 20-item version that is commonly used in research [5]. The 20-item PIQ has two subscales: positive support and negative support [5]. The positive support subscale captures partner behaviors that are congruent with the formal definition of social support, such as encouragement and positive reinforcement of quit attempts. Items on the negative support subscale refer to behaviors, such as nagging and policing, that, by strict definition, are not supportive; rather, these items reflect criticizing and complaining behaviors [11]. Both criticizing and complaining involve expressing disapproval, but differ in the target of disapproval; criticisms involve disparaging one’s

character or personality, whereas complaints pertain to disapproval of a specific behavior [11].

Intervention and prospective correlational studies have used the PIQ to examine the relation between social support and smoking cessation and collectively offer an unclear picture of the type of support that is most useful in facilitating cessation. Positive support [9, 10, 12], negative support [10], and the ratio of positive/negative support [5] have each been identified as the best predictor of cessation. Other studies have found no relation between baseline PIQ scores and subsequent cessation [13, 14]. These mixed findings have led some authors to suggest that more nuanced distinctions between the items could improve the prediction of cessation [2].

The Present Research: Making Finer Distinctions between Types of Support

Although the customary two-factor PIQ distinguishes between positive and negative support, there is considerable conceptual heterogeneity in the items included in each subscale. For instance, instrumental and emotional supportive behaviors are theoretically and functionally unique [7], but both types of behavior are classified as positive support. Similarly, the types of behaviors on the negative support subscale are heterogeneous; items describe complaints about smoking behavior and criticisms of the smoker's character. Attending to the differences that exist within the subscales of the PIQ that have not been specified offers the opportunity to refine our understanding of the effect of social support on smoking cessation. Drawing upon data from an intervention study, we explore finer distinctions between items on the PIQ via exploratory factor analysis and examine the ability of emergent factors to predict smoking cessation.

Method

Study Design and Sample

We conducted secondary analyses using data from the Tobacco Longitudinal Care Study, which was a randomized controlled trial that compared long-term smoking cessation outcomes of a chronic disease management intervention (longitudinal care) to standard evidence-based treatment (usual care). Details of the study and main results have been previously published [15]. Current smokers ($n = 477$), ages 18–79 ($M = 40.3$) who were interested in quitting smoking in the next 2 weeks, were recruited to participate in the trial. Both groups in the trial received telephone counseling for smoking cessation and nicotine replacement therapy by mail. There was a 4-week run-in period before randomization in which all participants received identical treatment. Five scheduled calls took place during the run-in phase (pre-quit, 1–3 days post-quit, and 1, 2, and 4 weeks). Participants who completed at least three calls during the first 2 weeks of the run-in phase were randomized to and informed of the treatment assignment at the 4-week call. Subsequently, usual care participants received one additional phone call at 8 weeks (up to a total of six telephone counseling calls) and 8 weeks of nicotine replacement therapy. Longitudinal care participants received continued telephone counseling (at least monthly) and nicotine replacement therapy

for one year. Participants were mostly Caucasian (95%), 60 % were female, 45 % were married, and 60 % did not live with a smoker.

Measures and Data Collection

Data were collected at baseline, 21 days, and 3, 6, 12, and 18 months. The measures that were used in the analyses reported in this paper are described below.

The 20-item PIQ ([5]; see Table 1) was administered at baseline. Participants were asked how often they expected their partner or, if they were single, the person closest to them, to engage in a series of behaviors that relate to their smoking (e.g., asking one to quit smoking, commenting that the house smells of smoke). Participants rated the expected frequency of each behavior on a 5-point scale (0=*never*, 4=*very often*).

The behavioral outcome of interest was 7-day point prevalence, which is a dichotomous, single item, self-report measure that determines if participants have smoked at least part of a cigarette in the past 7 days. Having smoked at least part of a cigarette in the past 7 days was coded as *smoking*, whereas not smoking was classified as *abstaining*. This measure is widely used and is a relatively more appropriate outcome variable for our research questions than prolonged abstinence because we were interested in examining the degree to which the effect of the predictor variable, social support, on smoking outcomes varies over time. Seven-day point prevalence was measured at 21 days and 3, 6, 12, and 18 months.

Baseline cigarette dependence was controlled for in all models and was measured by the Cigarette Dependence Scale [16]. Higher scores indicate greater cigarette dependence.

Results

Results of the exploratory factor analysis of the PIQ data collected at baseline are presented below. Next, the results of analyses that used the emergent factors to predict 7-day point prevalence at 21 days and 3, 6, 12, and 18 months and separate analyses that used the customary positive and negative support subscales of the PIQ to predict 7-day point prevalence at the same time points are reported.

PIQ Factor Analysis

The baseline PIQ data were submitted to an exploratory factor analysis, using principle component analysis as the extraction method. Promax rotation, which is an oblique rotation, was selected because we assumed that the underlying dimensions of social support would be correlated.

Based on an examination of the screen plot and the eigenvalue-greater-than-1 selection criteria, a four-factor solution that accounted for 62.03 % of the variance was selected. Items were retained on a factor if the loading was equal to or greater than 0.40 and the difference between the highest and second highest loadings was 0.1 or greater. Eigenvalues, factor loadings, means, standard deviations and Cronbach's alphas for each factor are presented in Table 1. The first factor contains seven items (31.54% of the variance) that pertain to supportive emotional behaviors (e.g., compliment you on not smoking) and accordingly was

labeled *Emotional Support*. The second factor, labeled *Complaints about Smoking*, contains six items (19.28 %) that involve complaints about smoking behavior in general (e.g., criticize your smoking). The third factor, *Instrumental Support*, contains four items (5.90 %) that pertain to instrumental behaviors to aid in cessation (e.g., help you use substitutes for cigarettes). The fourth factor contains two items (5.31 %) that involve criticizing the smoker on a personal level (e.g., comment on your lack of will power) and was labeled *Critical of Smoker*. One item (“Commenting that the house smells of smoke”) cross loaded onto *Complaints about Smoking* and *Instrumental Support* and was discarded. With the exception of one item (“Talked you out of smoking a cigarette”), all the items that loaded onto the *Emotional Support* and *Instrumental Support* factors are found on the positive support subscale of the customary two-factor PIQ. All items that loaded on the *Complaints about Smoking* and *Critical of Smoker* factors came from the customary negative support behaviors subscale. Correlations between emergent subscales are presented in Table 2.

Using Emergent PIQ Factors and Customary PIQ Subscales to Predict 7-Day Point Prevalence

Scores on the four emergent PIQ factors, which will hereafter be referred to as four-factor PIQ subscales, were calculated by summing the ratings of items that loaded onto each factor; scores on the two customary PIQ subscales, which will hereafter be referred to as two-factor PIQ subscales, were also calculated by summing item ratings.

Logistic regression was used to predict 7-day point prevalence (0=*smoked*, 1=*abstained*) at 21 days and 3, 6, 12, and 18 months from the four-factor PIQ subscales. A separate, parallel set of analyses used the two-factor PIQ subscales to predict 7-day point prevalence at each time point. Variables that we wished to control for were entered into the first block of each model. All models controlled for nicotine dependence and, with the exception of the model that predicted 7-day point prevalence at 21 days, all models controlled for smoking status, as defined by 7-day point prevalence, at the previous time point. Gender and marital status were also controlled for in the first block of all models because these factors may be linked to the types, quantities, and quality of social support that smokers receive. Given that random assignment to intervention condition did not occur until 21 days, intervention condition is controlled for in the first block of all models predicting outcomes beyond 21 days. Social support predictors were entered into the second block of each model.

Predicting Smoking Status at 21 days—The first block of the regression model was not significant ($p = 0.242$). Analyses using the four-factor PIQ subscales revealed that the second block of the model, which contained the emergent factor subscales, was significant ($\chi^2(4) = 11.16, p = 0.025$). Specifically, *Complaints about Smoking* ($p = 0.008$) and *Critical of Smoker* ($p = 0.004$) significantly predicted abstinence, such that expecting one’s partner to be more critical of smoking behavior and less critical of the smoker was associated with a greater likelihood of abstinence. Betas, standard errors, odds ratios, and confidence intervals of the second block are presented in Table 3. The second block of the regression model that used the two-factor PIQ subscales to predict abstinence at 21 days was not significant; neither of the two-factor PIQ subscales predicted abstinence.

Predicting Smoking Status at 3 months—The first block of the model was significant ($\chi^2(5) = 148.00, p < 0.001$) with prior smoking status emerging as the sole significant predictor of smoking status at 3 months ($OR = 15.71$).

The second block of the model that contained the four-factor PIQ subscales was significant ($\chi^2(4) = 10.23, p = 0.037$). *Instrumental Support* ($p = 0.036$) emerged as the only significant predictor, such that expecting one's partner to offer less instrumental support at baseline was significantly associated with a greater likelihood of abstinence at 3 months (see Table 3).

The second block of the parallel analysis that examined the effects of the two-factor PIQ subscales was not significant, indicating that the positive and negative support subscales did not predict abstinence after the variables entered into block one were controlled for.

Abstinence at 6, 12, and 18 months—A series of additional models examined whether the four-factor PIQ subscales predicted 7-day point prevalence at 6, 12, or 18 months, controlling for the aforementioned variables. The first block of the model was significant at all time points (all $p < 0.001$) with prior abstinence consistently associated with a greater likelihood of present abstinence ($OR = 28.12, 11.32, 18.80$, respectively).

At all time points, the second block of the model did not reach statistical significance; baseline measures of social support did not predict smoking status at these time points. The same pattern of results was obtained in the parallel sets of analyses that entered the two-factor PIQ subscales into the second block of the models.

Discussion

To date, the literature regarding the types of social support that influence smoking cessation has been inconclusive, but researchers have focused on relatively broad categories of social support. The heterogeneous behaviors within the items of the PIQ offered an opportunity to explore finer distinctions. An exploratory factor analysis of the 20-item PIQ revealed four factors. The *Emotional Support* and *Instrumental Support* factors are largely derived from items that are found on the customary positive support subscale and are consistent with classic models of social support that distinguish between the emotional, instrumental, and informational functions of support [7]. Items on the PIQ do not query the extent to which partners offer advice or provide information, so it is not surprising that an informational support factor did not emerge in our analysis. The *Complaints about Smoking* and *Critical of Smoker* factors are comprised of items on the customary negative support subscale and capture the distinction between complaints and criticisms.

This analysis suggests that there is meaningful heterogeneity within the traditional subscales of the PIQ that has not been capitalized upon and that maps onto central concepts in the broader social support and interpersonal relationship literatures [7, 11]. Interestingly, when the original 76-item measure was developed, judges identified four groups of items using card sorting and cluster analyses [9]. However, the items within each cluster were not published and these clusters have not since been used in the literature. Unfortunately, many of the items used in the 20-item PIQ are not found on the 76-item version (R. Mermelstein,

personal communication, December 12, 2012), negating comparisons between the present analysis and this earlier work.

Predicting Smoking Outcomes at 21 Days

The *Complaints about Smoking* and *Critical of Smoker* factors predicted being quit, such that more complaints about smoking and less criticism of the smoker were associated with subsequent abstinence. In contrast, the customary negative support subscale, which pools these two factors, did not predict smoking outcomes. It is possible that the negative support subscale's inconsistent ability to predict outcomes is partially due to a melding of these two distinct factors, which tend to predict in opposite directions.

The differential influence of the *Critical of Smoker* and *Complaints about Smoking* factors is consistent with findings from research on marital conflict. Criticism, which is seen in the *Critical of Smoker* items, is associated with a host of negative relationship outcomes and qualities (e.g., hostility, divorce), whereas complaints, which are seen in the *Complaints about Smoking* items, are a more constructive means of managing points of contention within relationships [11, 17, 18]. A partner who uses criticism contributes to a negative relationship dynamic, which creates a stressful environment that may not be conducive to quitting smoking [see 2]. However, complaints about smoking behavior allow partners to voice their disapproval in a manner that promotes a cooperative approach to managing conflict.

Westmaas and colleagues [2] have proposed a process model that specifies how social support may facilitate the cessation process by buffering stress. According to this model, conflict within a relationship may hinder cessation by introducing a source of stress and by undermining the amount of support that the smoker perceives to have and actually receives [2]. Models of this type will likely prove to be helpful in specifying the types of partner behaviors that help or hinder smoking cessation; by thinking about *how* and *why* partners influence smoking cessation, we may be better able to specify the classes of behaviors that best predict cessation outcomes.

Predicting Smoking Outcomes at 3 Months

Factors from the four-factor model of the PIQ continued to predict abstinence at 3 months, even after controlling for smoking status at 21 days. Although the effect of *Complaints about Smoking* on cessation at 3 months did not reach conventional levels of significance, the pattern was consistent with that observed at 21 days. Higher reports of *Instrumental Support* predicted a decreased likelihood of abstaining at 3 months; a pattern of results inconsistent with prior findings [2, 7]. The PIQ assesses smokers' *expectations* of how frequently their partner will perform instrumental behaviors; if these initial expectations are not met, then smokers may feel particularly unsupported. It is also possible that some smokers expected minimal *Instrumental Support* from their partner because they were confident in their own ability to quit.

Predicting Smoking Outcomes beyond 3 Months

Neither the customary nor the emergent subscales measured at baseline predicted outcomes beyond 3 months when prior smoking status was controlled for. A number of explanations may account for this finding. First, social support may not affect smokers' efforts to quit or maintain smoking cessation 6 months into an intervention. This is consistent with the observation that structural network properties, such as the number of smokers in one's social network, matter more than direct social support in maintaining abstinence [1]. Second, it is possible that baseline PIQ data are not predictive because they no longer describe expectations for partner behavior accurately. Six months into a cessation attempt a partner's supportive behavior may have changed (e.g., he/she becomes less supportive and/or less critical) and it is this new pattern of support that influences smoking behavior. It is also possible that partner behavior has remained constant, but respondents' perceptions have changed over time. For instance, smokers may habituate to their partners' criticism or encouragement. Finally, the types of supportive behaviors that matter at 6 months or later may not be measured by the PIQ. For instance, the PIQ includes questions that largely pertain to initiating cessation (e.g., asked you to quit smoking) and does not include questions about the supportive behaviors that may be necessary for maintaining abstinence or coping with several failed quit attempts.

Collectively, these results highlight how using more nuanced measures of social support can provide new insight into the relation between social support and smoking behavior. Although several broad health behavior and social support models make predictions about the specific types of social support that are most helpful for smoking cessation and when these types of support are most useful [e.g., 2, 7, 11], this specificity is not captured in current measures of social support for smokers who are seeking to quit, indicating the need to develop new, more precise measures of social support.

Implications for Intervention Development

Several interventions have sought to facilitate cessation by training romantic partners or friends to support smokers who are trying to quit, but few have demonstrated that introducing social support improves quit rates [for review see 3, 4]. Proffered explanations for the unimpressive outcomes of these interventions include failure of the intervention to change partners' behavior and intervention designs that do not isolate the social support variable [3, 4]. However, given the lack of specificity in our measures and theoretical models of social support during the cessation process, it is possible that the particular types of social support that are helpful at various time points during the smoking cessation process have not been targeted. Improving the precision with which we specify the role of social support may elucidate the types of social support that interventions should target. Moreover, improved measures can verify that the targeted types of social support are indeed being changed by the intervention.

Limitations and Future Research Directions

Our analyses were subject to two major limitations. First, the data were collected in the context of a telephone counseling intervention in which all participants received treatment for the first 4 weeks of the intervention and all participants received nicotine replacement

therapy for at least the first 8 weeks. During calls, counselors offered social support, skills training, and problem-solving assistance. As a result, the support offered as part of the intervention may have eclipsed the latent effect of partners' emotional and instrumental support on cessation. Longitudinal prospective studies will be useful in addressing this possibility and provide a more definitive picture of the types of partner behaviors that facilitate or hinder smoking cessation in the absence of formal treatment. Second, because we used an extant measure of social support, the factors that emerged from our factor analysis were limited to the items on the PIQ and, thus, were not representative of all theoretically important classes of partner behaviors. In the future, theory should be used to guide the development of new items.

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Table 1

Item and factor loadings from exploratory factor analysis and descriptive statistics for the Partner Interaction Questionnaire (PIQ; $n = 466$)

Item	Factor I: emotional support	Factor II: complaints about smoking	Factor III: instrumental support	Factor IV: critical of smoker
Congratulate you on your decision to quit smoking ^a	0.723			
Compliment you on not smoking ^a	0.823			
Celebrate your quitting with you ^a	0.779			
Help you calm down when you are feeling stressed or irritable ^a	0.612			
Tell you to stick with it ^a	0.803			
Express confidence in your ability to quit/remain quit ^a	0.668			
Express pleasure at your efforts to quit ^a	0.890			
Asked you to quit smoking ^b		0.762		
Comment that smoking is a dirty habit ^b		0.758		
Refuse to let you smoke in the house ^b		0.483		
Mentioned being bothered by smoke ^b		0.861		
Criticize your smoking ^b		0.853		
Refuse to clean up your cigarette butts ^b		0.568		
Participates in an activity with you that keeps you from smoking (e.g., going for a walk instead of smoking) ^a			0.565	
Help you use substitutes for cigarettes ^a			0.797	
Help you think of substitutes for smoking ^a			0.672	
Talk you out of smoking a cigarette ^b			0.556	
Comment on your lack of will power ^b				0.756
Express doubts about your ability to quit/stay quit ^b				0.852
Eigenvalue	6.308	3.856	1.180	1.062
Cronbach's Alpha	0.867	0.829	0.763	0.715
Mean	20.10	12.27	7.81	2.60
(SD)	(6.47)	(7.16)	(3.99)	(2.30)

PIQ item "Commenting that the house smells of smoke" loaded onto factors II (0.408) and III (0.420) and is not shown here

^a Item included in the positive support behavior subscale of the two-factor PIQ

^b Item included in the negative support behavior subscale of the two-factor PIQ

Table 2

Correlations between four-factor Partner Interaction Questionnaire subscales

	Complaints about smoking	Instrumental support	Critical of smoker
Emotional support	0.221 [*]	0.627 [*]	−0.128 [*]
Complaints about smoking		0.335 [*]	0.450 [*]
Instrumental support			0.042

n's range 469–475^{*}
p < 0.01

Second block logistic regression models using the four-factor Partner Interaction Questionnaire subscales to predict 7-day point prevalence at 21 days and 3 months

Table 3

	21 days		3 months ^a	
	B(SE)	p	B(SE)	p
Emotional support	-0.006 (0.021)	0.790	0.033 (0.027)	0.234
Complaints about smoking	0.047 (0.018)	0.008	0.040 (0.022)	0.074
Instrumental support	-0.010 (0.034)	0.776	-0.093 (0.044)	0.036
Critical of you	-0.155 (0.054)	0.004	0.070 (0.068)	0.298
<i>n</i>	423		404	

First block controls for gender, marital status, and nicotine dependence; 7-day point prevalence coded 0=smoked; 1=abstained

^a Analysis also controls for 7-day point prevalence at 21 days and intervention condition, which was assigned at 4 weeks