Original Investigation

Dyadic Efficacy for Smoking Cessation: Preliminary Assessment of a New Instrument

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Abstract

Introduction: Smoking cessation research has demonstrated a link between social support and quitting, but interventions designed to enhance partner support have often failed. We adapted and tested a measure of dyadic efficacy to assess smokers' confidence in their abilities to work together as a team with their partners to quit smoking and cope with quitting challenges. Our goal was to establish the psychometric properties of the dyadic efficacy instrument, including its associations with cessation outcomes.

Methods: We recruited partnered smokers who called the American Cancer Society's Quitline and administered telephone interviews ($N = 634$, 59% female, average age = 40 years). Interviews included 8 dyadic efficacy items and a variety of sociodemographic, smoking history, and relationship variables at baseline and quit outcomes at 4 months.

Results: Factor analysis of the dyadic efficacy items yielded a 1-factor scale with strong internal consistency ($\alpha = .92$). Dyadic efficacy was positively associated ($p < .0001$) with smoking-specific support ($r = .51$), relationship satisfaction ($r = .44$), and dyadic coping ($r = .54$). Dyadic efficacy was not associated with age, gender, race, relationship length, smoking quantity, or previous quit attempts. Respondents with smoking partners who were willing to quit with them had higher dyadic efficacy than those whose smoking partners were not ($p < .0001$). Higher baseline dyadic efficacy was predictive of 7-day point prevalence quit rates at follow-up (odds ratio = 1.25, 95% CI = 1.02–1.53).

Conclusions: With further study, dyadic efficacy may enhance our understanding of the role of partner relationships in smoking cessation.

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Introduction

Although social support has been studied extensively, its mechanisms are not understood in the context of smoking cessation. In fact, despite some evidence that support is associated with smoking abstinence (Coppotelli & Orleans, 1985; Gulliver, Hughes, Solomon, & Dey, 1995; Mermelstein, Cohen, Lichtenstein, Baer, & Kamarck, 1986), many interventions designed to enhance support for smoking cessation have failed to achieve desired results (Park, Schultz, Tudiver, Campbell, & Becker, 2008). To inform the development of smoking cessation interventions that attempt to capitalize on the potential benefits of close personal relationships, it is critical to understand the mechanisms underlying effective support for cessation (Westmaas, Bontemps-Jones, & Baueret, 2010).

One potential reason why social support has been inconsistently linked to cessation is that the interventions have varied widely. Often, a social support intervention is offered in the midst of other intervention components, which may limit the salience of the support dimension to recipients. In addition, because it is common for both partners in couples to smoke (Di Castelnuovo, Quacquarello, Benedetta Donati, de Gaetano, & Iacoviello, 2009), the development and evaluation of interventions for social support among partnered couples can be complex. Specific intervention challenges may be faced when motivation to quit is discordant between partners. Also, in the case when both partners are motivated to quit, each partner must play the dual role of providing and receiving support simultaneously. Patterns of smoking concordance in couples (i.e., status, cessation, and relapse) are complex and may vary by gender, length of relationship, and type of study population (e.g., Collins, Emont, & Zywiak, 1990; Homish & Leonard, 2005; McBride et al., 1998). Finally, some interventions

have focused on partner involvement in cessation efforts but have not specifically differentiated between positive and negative (e.g., nagging) support. The use of new theoretical frameworks, which acknowledge the complexities of close personal relationships and smoking behaviors, may reveal new strategies for supportive interventions.

Teamwork within close relationships may offer a unique theoretical perspective in the context of trying to quit smoking. Because individuals are involved in interdependent relationships in which the actions and emotions of one partner continuously affect the other (Holmes, 2000), a dyadic approach to smoking cessation may be adaptive. This approach acknowledges behavior change and coping as interdependent processes in which both partners are involved in efforts to reach a common goal (Bodenmann, 1997). When trying to change smoking behaviors in one or both partners in a couple, having shared goals around behavior change may facilitate positive outcomes. Based on the association between self-efficacy and quitting success (Carpenter, Hughes, Solomon, & Callas, 2004; Herd & Borland, 2009; Herd, Borland, & Hyland, 2009), we extend this research by examining an interpersonal form of self-efficacy, which we term "dyadic efficacy." We define dyadic efficacy as an individual's perceptions of confidence about his or her shared abilities with a partner to quit smoking and manage the emotional and practical challenges associated with quitting. Dyadic efficacy has previously been examined in the context of chronic illness management (Sterba et al., 2007), demonstrating positive associations with marital satisfaction and psychological adjustment. It is unclear if the construct of dyadic efficacy applies to other domains of behavior change, particularly smoking.

The primary aim of the present study was to adapt an existing dyadic efficacy instrument and establish its psychometric properties in relation to smoking cessation. In this study, we focus solely on cohabiting partnerships because of the close nature of this personal relationship (Cutrona, 1996). We include individuals with both smoking and nonsmoking partners and hypothesized that both partner smoking status and quit intentions would be associated with dyadic efficacy. Also, we hypothesized that dyadic efficacy would vary by smoking history and relationship factors. Finally, we hypothesized that dyadic efficacy would be positively associated with short-term quitting success.

Methods

Item Generation

Consistent with our goal to explore the concept of dyadic efficacy in smokers and to reduce participant burden, we initially drafted 10 dyadic efficacy items. Item generation was guided by the smoking cessation and social support literatures, and previous work in dyadic efficacy for managing chronic illness focused on problem solving and emotions (Sterba et al., 2007). The resulting items focused on key areas of smoking cessation (e.g., medication use, counter conditioning, and self-evaluation; Prochaska, Velicer, DiClemente, & Fava, 1988) as well as positive support behaviors (e.g., celebrating quit efforts, focusing on the benefits of quitting, and helping you do other things besides smoking; Cohen & Lichtenstein, 1990). In line with our conceptualization of teamwork as an adaptive approach, we focused on positive rather than on negative support (Cohen & Lichtenstein,

1990). The initial draft of items was reviewed by a small panel of experts, including a social psychologist with expertise in social support and behavior change, and researchers and practitioners with expertise in smoking cessation. This process resulted in the modification of several items for clarity and dropping two items that lacked focus. Next, using a convenience sample of six married or partnered nonsmokers, we pretested the questionnaire for clarity and length. Finally, the properties of the eight-item instrument were examined in the cohort described below.

Sample and Protocol

Our study sample included smokers in the state of Texas who from May 2007 to April 2008 called the American Cancer Society's Quitline with interest in quitting smoking. The Quitline is an evidence-based program whose effectiveness has been demonstrated in several large-scale randomized clinical trials (Rabius, McAlister, Geiger, Huang, & Todd, 2004; Rabius, Pike, Hunter, Wiatrek, & McAlister, 2007). The Quitline is a free service available 7 days a week and 24 hr per day to all Texas residents. Interested individuals are asked to call a toll-free number, and callers are screened and matched to available resources based on their preferences and readiness to quit smoking. Minors, pregnant women, and smokeless tobacco users are referred to specialized programs; thus, these populations were not included in the present sample. The current sample was restricted to Quitline callers who were (a) currently living with someone they considered to be their partner, (b) aged 18 years or older, (c) currently smoking cigarettes daily (any amount), and (d) willing to complete a 10-min survey. We did not make exclusions based on either the partner's smoking status or quit intentions. Participants completed telephone surveys immediately at baseline and during routine Quitline-initiated 4-month follow-up calls; all data were collected using a computer-assisted telephone interview system.

Measures

Dyadic Efficacy

We assessed perceptions of dyadic efficacy at baseline using eight items that were established during our pilot work described above. Items generally centered on the global theme of confidence in one's abilities to work together with a partner to manage the problems that arise in trying to quit smoking. Each item had the following introduction, "How confident are you that you and your partner can work together as a team to . . ." followed by a specific behavior. Respondents selected one number on a scale from 0 (*not at all confident*) to 100 (*extremely confident*); items were averaged, and higher scores reflected higher dyadic efficacy.

Sociodemographic Variables

We assessed age, gender, race, ethnicity, years of education, and health insurance status (yes/no) at baseline.

Smoking Variables

Participants reported the age they started smoking regularly, number of previous quit attempts, whether they had attempted to quit smoking in the past twelve months (yes/no), and average daily smoking quantity. Participants were coded for the type of Quitline services received (self-help materials only or telephone counseling plus self-help materials). Participants were also asked to complete one item assessing self-efficacy for quitting

using a response set from 0 (*not at all confident*) to 100 (*extremely confident*). At follow-up, participants were asked whether they had used cessation medication (i.e., gum, patch, or pills) to help them quit over the past four months (yes/no); whether they had made a quit attempt for at least 24 hr over the past four months (yes/no); and whether they had smoked at all, even a puff, in the past seven and thirty days (yes/no). Thus, follow-up cessation was defined via both 7 and 30-day point prevalence abstinence rates. We did not include biochemical verification of abstinence as this was impractical with a Quitline sample. However, prior research has shown that false reports of abstinence are rare within minimally intensive interactions (Benowitz et al., 2002; Hughes et al., 2003).

Relationship Variables

All relationship variables were assessed at baseline only and included the following: (a) number of years married or living with one's partner (if married or partnered, respectively); (b) partner's smoking status; and (c) if partner was a smoker, whether she/he was willing to quit along with the respondent (yes/no). "Dyadic coping" was assessed using a modified version of the dyadic coping subscale of the Bodenmann Dyadic Coping questionnaire (Bodenmann, 1997). Five items from the original instrument were modified to be specific to the smoking cessation context (e.g., "my partner and I engage in serious discussions about smoking-related problems and think through what has to be done"), and respondents rated how often each of the statements was true for them (1 = *very rarely* to 6 = *very often*; Cronbach's α = .88 for current study sample). "Relationship satisfaction" was measured using a modified version of the Kansas Marital Scale (Schumm et al., 1986) to assess respondents' satisfaction with their significant other as a partner, their overall partnership, and their relationship with their partner at baseline (1 = *not satisfied* to 6 = *very satisfied*; Cronbach's α = .92 for current study sample). We also assessed "smoking-specific support behaviors" using an instrument developed internally for use in Texas Quitline studies. Respondents were asked how often over the past three months (1 = *very rarely* to 6 = *very often*) they had experienced each of five support behaviors (e.g., "received praise from your partner for trying to quit smoking, received encouragement from your partner that helped you in your efforts to quit"); Cronbach's α = .80 in the current study sample. Finally, we used one item to assess "teamwork standards" (Sterba et al., 2007), the extent to which individuals believed that problems arising in trying to quit smoking should be handled as a team (vs. individually) using a response set that ranged from 1 (should be handled by me as an individual) to 10 (should be handled together as a team).

Analysis

To facilitate our measurement analyses in this exploratory study and to allow us to attempt to replicate the factor structure of our dyadic efficacy items in more than one sample, we used a simple random sampling technique in SAS (version 9.1) to separate our sample into two random groups. After confirming that the groups were similar across measures (data not shown), for each of the two samples, we conducted exploratory factor analysis on the dyadic efficacy items using SAS. We planned to retain factors when scree plots showed a substantial drop in the amount of information provided when an additional factor was included and when eigenvalues were approximately 1.0 (Nunnally,

1978). Items with factor loadings (i.e., standardized regression coefficients) more than 0.5 were retained when they also did not crossload (or load on any other factor greater than 0.3; DeVellis, 2003). We examined identified item groupings for internal consistency by computing Cronbach's alphas (Cronbach, 1951).

To provide preliminary evidence of construct validity, we used Pearson correlations for continuous variables and analysis of variance for categorical variables to examine the relationships between dyadic efficacy and sociodemographic, smoking history, and relationship variables. Despite the multiple tests run, due to the exploratory nature of this study, we viewed a p value of .05 as evidence for significant relationships in our bivariate analyses to generate hypotheses for future studies. Next, we used multiple regression to further explore the cross-sectional relationships between dyadic efficacy and smoking-specific support behaviors, dyadic coping, and self-efficacy for quitting while controlling for sociodemographic, smoking history, and relationship variables.

Finally, to explore the predictive validity of dyadic efficacy, we used regression to explore the relationships between dyadic efficacy at baseline and self-efficacy and cessation behaviors (quit attempts, use of medication, and 7- and 30-day abstinence) at follow-up. First, we used linear regression to examine the relationship between dyadic efficacy at baseline and self-efficacy at follow-up, controlling for self-efficacy at baseline and sociodemographic and smoking history variables. Next, we used logistic regression to examine the relationships between dyadic efficacy at baseline and the 4-month cessation behaviors defined above, using an unadjusted and three sets of adjusted models. In the first set of adjusted models, we controlled for Quitline service use (telephone counseling vs. self-help materials) only. In the second set of adjusted models, we controlled for smoking-specific support only. In the third set of adjusted models, we added sociodemographic and smoking history variables as well as partner smoking status, Quitline service use, and smoking-specific support to the models. Because dyadic efficacy is a continuous variable with responses from 0 to 100, we created an ordinal variable (1 = 0–10, 2 = 11–20, 3 = 21–30, 4 = 31–40, 5 = 41–50, 6 = 51–60, 7 = 61–70, 8 = 71–80, 9 = 81–90, and 10 = 91–100) to facilitate our interpretation of odds ratios, an approach that also offers more meaningful clinical interpretation (i.e., a 10-unit increase in dyadic efficacy vs. a 1-unit increase). These analyses were conducted in respondents only ($n = 204$).

Results

Participant Characteristics

Of the 4,281 Quitline callers during the study period, the majority (91%) were willing to be screened for study inclusion. Of the 3,916 screened for the study, 1,056 (27%) met eligibility criteria. Primary reasons for exclusion were (a) not currently living with a partner (43%) and (b) not personally quitting (43%). Of those eligible for the study, 634 (60%) agreed to participate, thus comprising our final study sample (Table 1). Participants were primarily female, married, and on average, 40 years old. Study participants had been smoking for an average of 24 years, smoked an average of 20 cigarettes/day, and reported an average of six prior quit attempts. Reasons for not agreeing to participate

Table 1. Participant Characteristics (N = 634)

	% ^a
Age, <i>M</i> (<i>SD</i>)	40.5 (13.0)
Gender	
% Female	59.3
Race	
European American	60.2
Black	14.4
Hispanic	23.3
American Indian/Native American	1.9
Asian	0.2
Ethnicity	
% Hispanic	22.8
Education level	
Grades 1–8	4.9
Grades 9–12/GED	48.0
Some college or technical school	33.8
College graduate	10.9
Graduate school	2.4
Health insurance status	
% Uninsured	45.3
Primary language	
% English	92.1
Marital status	
% Married	69.4
Years married (<i>n</i> = 440)	
<1	9.1
1–5	26.4
6–10	19.3
11–15	13.4
16–20	8.9
21–25	8.2
>25	14.7
Years living together (<i>n</i> = 194)	
<1	25.3
1–5	52.6
6–10	14.9
11–15	4.1
16–20	0.5
21–25	1.6
>25	1.0
Partner smoking status % smokers	54.1
Willing to quit with you ^b	
Yes	69.1
No	13.4
Unsure	17.5
Age started smoking, <i>M</i> (<i>SD</i>)	16.1 (5.1)
Average daily cigarettes, <i>M</i> (<i>SD</i>)	19.9 (10.9)
Years smoked, <i>M</i> (<i>SD</i>)	24.4 (12.9)
Quit attempted in past twelve months	
% Yes	59.0
Number previous quit attempts, <i>M</i> (<i>SD</i>)	6.3 (11.2)
Self-efficacy for quitting, <i>M</i> (<i>SD</i>)	77.7 (23.9)

Note. GED = General Educational Development test.

^aUnless otherwise noted.

^bAmong only those who had a smoking partner (*n* = 343).

were not systematically collected, but we found that those who declined were not different from those who participated in age, gender, education level, race, number of years smoked, number

of previous quit attempts, daily smoking quantity, or self-efficacy (all *p*'s > .20).

Four-month follow-up surveys were completed for 204 (32%) of study participants. Among those who did not complete follow-up surveys (*n* = 430), consistent with typical Quitline follow-up rates (Rabius et al., 2007), the most common reason for not completing follow-up surveys was loss to follow (86%). Other reasons included relocation (8%), active refusal (5%), and death (1%). Those who completed the follow-up surveys were slightly older (45 vs. 38 years old, *t* = −6.2, *p* < .0001) and had smoked for a greater number of years (28 vs. 23 years, *t* = −5.2, *p* < .0001) than those who did not complete the follow-up survey. No other differences were found in other sociodemographic, smoking history, or relationship variables, including reports of dyadic efficacy, between those who completed the follow-up surveys and those who did not.

Factor Analysis

In our first sample (*n* = 317), exploratory factor analysis revealed a one-factor solution (first eigenvalue = 5.13) explaining 64.1% of the total variance with factor loadings ranging from 0.60 to 0.89. The replication sample (*n* = 317) revealed a very similar one-factor solution (first eigenvalue = 5.36) explaining 67.0% of the total variance with factor loadings ranging from 0.66 to 0.89. Table 2 presents the eight dyadic efficacy items, factor loadings, and Cronbach's alphas for the full sample and for each of our two random samples. Given the similarity between the two samples, we combined the data into one cohort (dyadic efficacy *M* = 80.7, *SD* = 20.9).

Construct Validity

Table 3 shows relationships between dyadic efficacy and a variety of continuous variables in our study. Of highlight, dyadic efficacy was positively associated with smoking-specific support behaviors, relationship satisfaction, self-efficacy for quitting, dyadic coping, and teamwork standards. In multivariable linear regression models, dyadic efficacy was significantly associated with smoking-specific support behaviors (*B* = 0.02, *SE B* = 0.003, β = .44, *p* < .0001) and dyadic coping (*B* = 0.03, *SE B* = 0.002, β = .49, *p* < .0001) when we controlled for education level, relationship satisfaction, number of daily cigarettes, and partner smoking status. When we added self-efficacy to these two models, dyadic efficacy remained significant (*p* < .0001), while self-efficacy was not significant.

Dyadic efficacy was higher among participants whose partners did not smoke (*M* = 82.7, *SD* = 21.3) as compared with those with smoking partners (*M* = 79.0, *SD* = 20.5; *p* = .03). In those with a smoking partner (*n* = 342), dyadic efficacy was higher among those whose partner was motivated to quit (*M* = 84.0, *SD* = 14.8) as compared with those whose partner was not (*M* = 67.7, *SD* = 26.2; *p* < .0001). Dyadic efficacy was unrelated to gender, race, marital status, insurance status, and type of Quitline services used (data not shown).

Predictive Validity

In a longitudinal regression model, dyadic efficacy at baseline was positively associated with higher self-efficacy for quitting at follow-up, controlling for baseline level of

Table 2. Dyadic Efficacy Items, Cronbach's Alphas, and Factor Loadings

Item ^a	Sample 1 ($\alpha = .92$)	Sample 2 ($\alpha = .93$)	Full sample ($\alpha = .92$)
Learn other things for you to do instead of smoke?	.82	.83	.82
Make a decision about medications to help you quit smoking?	.60	.66	.63
Focus on the benefits of quitting smoking?	.75	.73	.74
Make you feel better when you are feeling down about quitting?	.79	.84	.81
Manage the daily smoking-related problems that come up?	.89	.86	.87
Deal with the ups and downs of trying to quit?	.87	.89	.88
Deal with the negative emotions you experience while trying to quit?	.81	.87	.84
Do what it takes to quit smoking for good?	.85	.83	.84

Note. ^aEach item begins with the statement "How confident are you that you and your partner can work together as a team to . . ."

self-efficacy, smoking-specific support, education, number of daily cigarettes smoked, and partner smoking status ($B = 0.41$, $SE B = .19$, $\beta = .18$, $p = .04$). As shown in Table 4, higher dyadic efficacy at baseline was predictive of higher 7-day quit rates and marginally higher 30-day quit rates at follow-up in both our unadjusted models and our models adjusting for Quitline service use alone and smoking-specific support alone. Dyadic efficacy was not predictive of 7-day quit rates when we adjusted for our full set of covariates (gender, education, self-efficacy, cigarette consumption, partner's smoking status, smoking-specific support, and Quitline service use).

Discussion

We adapted and tested an existing dyadic efficacy instrument to assess smokers' confidence in their abilities to work together as a team with their partners to quit smoking. The goal of this study was to explore a new teamwork construct that may enhance our understanding of the relationships between partner support and smoking cessation. The resulting unidimensional dyadic efficacy scale was reliable, short, and easy to administer by telephone. Consistent with prior research demonstrating that teamwork in the context of illness management is adaptive (Revenson, Kayser, & Bodenmann, 2005), dyadic efficacy was

associated with smoking-specific support from one's partner, relationship satisfaction, and dyadic coping. Dyadic efficacy was also higher in those who endorsed stronger beliefs that problems arising in trying to quit smoking should be managed together as a couple rather than as individually. This finding highlights the potential importance of considering individuals' preferences about teamwork in smoking cessation.

Contrary to our expectations, dyadic efficacy was not associated with relationship length or smoking history variables, such as number of years smoked or smoking quantity. It may be that one's confidence about teamwork in the context of smoking cessation is based more on the quality of the relationship with one's partner rather than the length of the relationship or the nature of the cigarette dependence. It is also possible that dyadic efficacy is related to other relationship and smoking variables that we did not measure, such as the history of quit attempts or prior experiences of negative support in the couple.

We found that participants whose cohabiting partners also smoked had lower dyadic efficacy than nonsmoking partners. This is consistent with prior research documenting the undermining effect of other smokers in the house when trying to quit (e.g., Walsh et al., 2007). In addition, in couples in which both partners were smokers, participants who believed their partners were willing to quit with them had higher dyadic efficacy for

Table 3. Pearson Correlations Between Dyadic Efficacy and Sociodemographic, Smoking history, and Psychosocial Variables

	1	2	3	4	5	6	7	8	9	10	11	12
1. Dyadic efficacy	–											
2. Dyadic coping	.54**	–										
3. Smoking-specific support	.51**	.72**	–									
4. Self-efficacy for quitting	.20**	.22**	.20**	–								
5. Relationship satisfaction	.44**	.31**	.31**	.11*	–							
6. Age	.01	.04	.03	.01	–.01	–						
7. Education level	–.10*	–.14*	–.12*	–.01	–.04	.06	–					
8. Relationship length	.005	.05	–.04	.08	.01	.62**	.01	–				
9. Years smoked	–.004	.06	.04	–.04	–.005	.92**	.02	.60**	–			
10. Number of daily cigarettes	–.03	.01	–.001	–.17**	–.07	.05	–.08	.002	.12*	–		
11. Previous quit attempts	–.05	.05	.02	.01	–.06	.02	.06	.04	.04	.05	–	
12. Teamwork standards	.26**	.23**	.20**	.04	.18**	.002	–.21**	.03	.03	.07	.02	–

Note. * $p < .05$. ** $p < .0001$.

Table 4. Logistic Regression Models: Dyadic Efficacy^a at Baseline as a Predictor of Quit Outcomes at 4-month Follow-Up (*n* = 204)

	24-hr quit attempt		Medication use		7-day point prevalence abstinence		30-day point prevalence abstinence	
	Yes	No	Yes	No	Yes	No	Yes	No
Abstinence rates, <i>n</i> (%)	135 (66.2)	69 (33.8)	86 (42.2)	118 (57.8)	56 (27.5)	148 (72.5)	42 (20.6)	162 (79.4)
Dyadic efficacy, <i>M</i> (<i>SD</i>)	81.9 (18.8)	77.3 (22.1)	78.3 (21.6)	82.1 (18.8)	85.4 (15.6)	78.3 (21.4)	85.5 (17.4)	78.9 (20.7)
	<i>OR</i> (95% <i>CI</i>) <i>p</i> value		<i>OR</i> (95% <i>CI</i>) <i>p</i> value		<i>OR</i> (95% <i>CI</i>) <i>p</i> value		<i>OR</i> (95% <i>CI</i>) <i>p</i> value	
Unadjusted models	1.12 (0.97, 1.31)	.13	0.92 (0.80, 1.07)	.29	1.25 (1.02, 1.53)	.03	1.21 (0.97, 1.50)	.09
Models adjusted for Quitline service use	1.12 (0.96, 1.31)	.14	0.91 (0.78, 1.06)	.24	1.26 (1.03, 1.55)	.03	1.22 (0.98, 1.51)	.08
Models adjusted for smoking-specific support	1.10 (0.93, 1.30)	.26	0.94 (0.80, 1.11)	.49	1.30 (1.04, 1.61)	.02	1.21 (0.96, 1.54)	.11
Models adjusted for all covariates ^b	1.06 (0.86, 1.30)	.61	0.93 (0.75, 1.15)	.49	1.16 (0.89, 1.52)	.26	1.05 (0.79, 1.38)	.74

Note. *OR* = Odds ratio.

^a*OR* for every 10-unit increase in dyadic efficacy (see text) as predictive of cessation behavior.

^bFully adjusted models controlled for self-efficacy for quitting, gender, number of daily cigarettes, partner's smoking status at baseline, smoking-specific support at baseline, and Quitline service use (telephone counseling vs. self-help).

quitting than those who did not. Because many smokers live or spend time with family and friends who also smoke (Di Castelnuovo et al., 2009), providing tools and resources to facilitate communication in dyads about cessation goals and efforts may be fruitful. For example, when only one partner in a couple wants to quit smoking, it may be possible to elicit the partner's support and plan strategies for limiting exposure to his or her smoking before beginning quit efforts. Specifically, working together as a couple to understand each partner's divergent goals and planning together for success may be adaptive.

Dyadic efficacy was modestly associated with self-efficacy for quitting. In particular, when we added self-efficacy to our cross-sectional regression models examining dyadic efficacy as a predictor of smoking-specific support behaviors and dyadic coping, dyadic efficacy remained a significant predictor of outcomes, while self-efficacy was not significant. These findings provide preliminary evidence that self-efficacy and dyadic efficacy are related but conceptually distinct constructs.

We found that dyadic efficacy was predictive of both increased self-efficacy for quitting over time and 7-day point prevalence abstinence rates. Because self-efficacy is an important precursor to behavior change (Bandura, 1986), a better understanding of the relationships between self-efficacy, dyadic efficacy, and support in couples in which one or both partners are trying to quit could be useful. If teamwork in couples can play a role in enhancing an individual's sense of personal control over quit efforts, teamwork-focused smoking cessation interventions could be developed and tested. That those with higher dyadic efficacy had more success with quit efforts (as measured by 7-day point prevalence quit rates) over time is also promising as a first-step validation of this new measure. That these findings became nonsignificant when we adjusted for additional covariates requires more research.

This was an exploratory study in which we adapted items from an existing dyadic efficacy instrument to examine teamwork in couples in which at least one partner was motivated to quit smoking. There are important study limitations to consider as we only examined eight dyadic efficacy items at a single timepoint, limiting our ability to make conclusions about the properties of the instrument over time. In addition, because all participants were callers to a Quitline with some degree of motivation to quit, they are not representative of the general smoking population. It is possible that the concept of working together as a team is very different in a sample in which motivation and efficacy to quit are more variable. Indeed, smokers in our study had high levels of dyadic efficacy at baseline, and it may be that this reflects a unique group of couples with better than average relationships. In addition, we collected data from only one partner in dyads, preventing us from understanding the support providers' perspectives. An additional limitation is that our response rates at follow-up were low, limiting our ability to detect potential relationships between dyadic efficacy and quit outcomes over time. In addition, important aspects of relationship functioning were not assessed in this study. In particular, we did not assess negative support, which may be relevant to dyadic efficacy and quit outcomes particularly in couples for whom teamwork is maladaptive. Finally, we did not assess relationship functioning at follow-up, and it is possible that changes in relationships over the course of the study could impact dyadic efficacy or smoking cessation outcomes.

Given our preliminary findings, future studies should examine dyadic efficacy over time to evaluate its properties and stability over the quit attempt process. In addition, future studies should examine perceptions of dyadic efficacy in both partners in couples and assess potential relationships between dyadic efficacy and other outcomes important to quitting. Also, because research shows that negative support can undermine

smoking cessation efforts in the context of smoking cessation (e.g., Cohen & Lichtenstein, 1990), future research should examine how dyadic efficacy relates to specific support and coping behaviors across the process of trying to quit. With further testing, this dyadic efficacy instrument could be useful to further our understanding of how partners work together to cope with the challenges of quitting smoking. For example, just as prior smoking cessation interventions have been informed by Social Cognitive Theory (Bandura, 1986) by building smokers' self-efficacy and skills using goal-setting, modeling, and reinforcement to achieve cessation goals, similar interventions could be developed to improve dyadic efficacy for smoking cessation in couples. For example, one couple's intervention based on family systems principles (Shoham, Rohrbaugh, Trost, & Muramoto, 2006) was found to be feasible and showed promising abstinence rates of 50% at 6 months for program participants. Ultimately, research in the area of teamwork may inform the development of interventions to improve outcomes in partnered smokers.

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Declaration of Interests

None declared.

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