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The Relationship Antecedents of Smoking (RAS) Scale: A new scale to assess couple-focused triggers to smoke.

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Abstract

The purpose of this pilot study is to assess the reliability and construct validity of a measure of relationship-focused antecedents for smoking (RAS). The scale includes both positively-valenced items (e.g., “I feel like smoking when I am relaxing with my partner”) and negatively-valenced items (e.g., “I feel like smoking when my partner criticizes me”). Participants included 123 individuals who smoke cigarettes with co-habiting smoking (n=63) or non-smoking (n=60) romantic partners. Participants completed the RAS and a series of measures associated with smoking outcomes. Principal component analysis with varimax rotation resulted in a 2-component solution. The RAS showed excellent internal consistency for the total scale ($\alpha=.96$) and for the positive ($\alpha=.88$) and negative ($\alpha=.97$) subscales. Higher positive subscale scores were associated with lower motivation to quit while higher negative scores were associated with lower relationship satisfaction and dyadic efficacy to quit. Higher scores on both subscales were related to higher social motives, dependence motives, and social outcome expectancies. Participants with smoking partners reported higher positive subscale scores and lower negative subscale scores. The RAS may be helpful in the design of smoking cessation interventions for couples.

Keywords

cigarette smoking, couples, smoking cessation

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The Relationship Antecedents of Smoking (RAS) Scale: A New Scale to Assess Couple-focused Triggers to Smoke

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Abstract

In this pilot study, we assessed the reliability and construct validity of a measure of relationship-focused antecedents for smoking (RAS). The scale includes both positively-valenced items (e.g., “I feel like smoking when I am relaxing with my partner”) and negatively-valenced items (e.g., “I feel like smoking when my partner criticizes me”). Participants included 123 individuals who smoke cigarettes with co-habiting smoking ($n = 63$) or non-smoking ($n = 60$) romantic partners. Participants completed the RAS and a series of measures associated with smoking outcomes. Principal component analysis with varimax rotation resulted in a 2-component solution. The RAS showed excellent internal consistency for the total scale ($\alpha = 0.96$) and for the positive ($\alpha = 0.88$) and negative ($\alpha = 0.97$) subscales. Higher positive subscale scores were associated with lower motivation to quit, whereas higher negative scores were associated with lower relationship satisfaction and dyadic efficacy to quit. Higher scores on both subscales were related to higher social motives, dependence motives, and social outcome expectancies. Participants with smoking partners reported higher positive subscale scores and lower negative subscale scores. The RAS may be helpful in designing smoking cessation interventions for couples.

Keywords: cigarette smoking, couples, smoking cessation

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Introduction

Although rates of cigarette smoking in the United States (U.S.) have declined significantly, in 2020, approximately 12.5% of U.S. adults reported smoking (Cornelius et al., 2022). This may be somewhat attributable to high rates of relapse after quitting smoking (United States Department of Health and Human Services [USDHHS], 2000). Identifying both facilitative factors for smoking cessation and risk factors for relapse may help to improve these cessation rates. The smoking status of one’s romantic partner may be one such risk factor.

Research shows that mental and physical health and health behaviors are highly concordant in couples (Meyler et al., 2007),

and in fact, tobacco use is highly correlated within couples (Sutton, 1993). Estimates of concordance in couple smoking behavior range from 33% (Roski et al., 1996) to 75% (Kendrick et al., 1995). Several studies show that having a partner who smokes impedes cessation and increases the likelihood of relapse after a quit attempt (Dollar et al., 2009; Manchon Walsh et al., 2007). On the other hand, research indicates that having a nonsmoking partner predicts successful smoking cessation (Monden et al., 2003). However, there have been few studies that have examined the factors related to the romantic relationship that may impact smoking status.

Research has examined the impact of partner support for quitting in dual-smoker couples. Haskins et al. (2021) found preliminary support for a three-factor measure (Partner Support for Quitting Scale) of partner support such that the frequency, confidence, and perceived usefulness of partner support predicted self-efficacy and desire to quit. However, this study only included individuals in smoking concordant couples. Individuals in smoking concordant couples (both partners smoke) may have different patterns of smoking, routines around smoking, and attitudes around quitting than individuals in smoking discordant couples (only one partner smokes). People in smoking concordant couples smoke less than those in discordant couples, but smoke more of their daily cigarettes with their partner present (Tooley & Borrelli, 2017). Also, partners in smoking concordant couples are more likely to smoke the same brand of cigarettes, share packs, buy cigarettes for each other, and have a “special place” where they smoke together. Partners in smoking concordant couples are also more likely to endorse a desire to include their partners in their smoking cessation treatment (Tooley & Borrelli, 2017). These important contextual smoking factors may be useful to target in smoking cessation interventions with couples.

Historically, though, the results of smoking cessation interventions that include peer support have been mixed (Park et al., 2004; Park et al., 2012). Few smoking interventions have included romantic partners in treatment. Interventions that focus exclusively on romantic partner support, however, are more effective (Park et al., 2004). A nonrandomized pilot study that included both smoking concordant and discordant couples showed promising results with a 50% rate of abstinence at six-months post-treatment (Shoham et al., 2006). A feasibility study found that participants in a

financial incentive intervention specifically for dual-smoker couples found it tolerable and beneficial in helping them quit smoking (Haskins et al., 2021). This study had a small sample and did not include a control group but provides initial support for the benefit of including both partners in a smoking cessation intervention.

Paradoxically, the involvement of a romantic partner in substance abuse interventions has long been recognized as integral to successful treatment. Developing stronger theory-driven interventions that incorporate partners into treatment may lead to more effective smoking cessation efforts. Cognitive-behavioral family systems models identify and attempt to modify the ways that the families or couples influence substance use triggers and consequences (McCrary et al., 2012). Alcohol-focused Behavioral Couple Therapy (ABCT; McCrary et al., 2016) is an example of an intervention that has been used to change the way families and partners serve as antecedents for alcohol use and may influence the positive and negative consequences of drinking. Using this model, identifying and changing the ways that romantic partners serve as antecedents for continued smoking may lead to more successful quit attempts in smoking partners.

To facilitate research in the area of smoking in couples and guide treatment development for couples in which one or both partners smoke, we examine the reliability and construct validity of a new measure of relationship antecedents of smoking (RAS) with two theoretically developed subscales, positive and negative relationship antecedents of smoking. Positive relationship antecedents refer to pleasant situations related to the relationship that are associated with smoking (e.g., celebrating) whereas negative antecedents refer to unpleasant situations related to the relationship that are associated with smoking (e.g., nagging). Specifically, in a sample of individuals who

cohabit with a smoking ($n = 63$) or nonsmoking ($n = 60$) romantic partner, in an initial pilot study, we examine whether relationship antecedents are associated with variables related to smoking outcomes in previous studies. These include smoking motives (Piasecki et al., 2011), dyadic efficacy to quit smoking (Regan Sterba et al., 2011), and smoking outcome expectancies (Stewart et al., 2013).

Whereas nicotine dependence certainly plays a role in continued smoking and relapse, it does not provide a complete picture of the complicated motivational constructs that lead to individual smoking behavior (Piper et al., 2004). The original Wisconsin Inventory of Smoking Dependence Motives (WISDM; Piper et al., 2004) was developed with 13 theoretically developed subscales that assess the physiological, psychological, and social dimensions that lead to nicotine dependence (Adkison et al., 2015). These 13 motives can be combined into two larger subscales, Primary Dependence Motives (PDM) and Secondary Dependence Motives (SDM). It appears that the PDM is related to the core nicotine dependence features while scores on the SDM represent more “instrumental or situation” reasons for smoking (Piasecki et al., 2011). Smoking antecedents specific to the romantic relationship context may be related to these different motives for smoking and there may be differences in these relationships depending on whether the relationship is concordant or discordant in terms of smoking status.

Dyadic efficacy for smoking cessation, or confidence in one’s ability to work with his/her partner as a team to quit smoking (Regan Sterba et al., 2011), is a variable that may inform theory and intervention development for couples in which one or both partners smoke. In one study of partnered individuals who smoke, higher baseline dyadic efficacy calling a quit-line predicted a

higher likelihood of abstinence four months later (Regan Sterba et al., 2011). This study also found that dyadic efficacy was higher among participants with a nonsmoking partner (versus participants with a smoking partner). We examine how relationship-specific antecedents are related to dyadic efficacy and whether this relationship is different in smoking concordant versus discordant couples.

Outcome expectancies, or expectations of the positive effects (i.e., pleasure) and negative consequences (i.e., health risks) have played a key role in substance abuse theory and also have been studied in subpopulations of people who smoke cigarettes (Carmody et al., 2012; Stewart et al., 2013). Previous research shows that positive expectancies are related to nicotine cravings (Bertin et al., 2018) and heavier smoking (Brandon & Baker, 1991). Although this measure has demonstrated reliability, validity in discriminating between groups of different smoking status, and predictive validity in predicting smoking outcome after smoking cessation (Wetter et al., 1994; Copeland et al., 1995), it focuses almost exclusively on individual-specific consequences of smoking, rather than on interactions with a partner.

Based on a cognitive-behavioral family systems model, we would expect that more positive antecedents for smoking would lead to continued smoking and more negative antecedents would lead to an increased desire to quit. More specifically, we hypothesize that higher positive relationship-related antecedents are related to lower motivation and confidence to quit smoking, higher dyadic efficacy to quit smoking, and higher relationship satisfaction; whereas higher negative relationship-related antecedents are be related to higher motivation and confidence to quit, lower dyadic efficacy, and lower relationship satisfaction. We explore the relationship between the RAS subscales

and smoking dependence motives and outcome expectancies. We also explore whether these relationships are different between participants with partners who smoke versus participants with partners who are nonsmokers. Finally, we hypothesize that individuals with smoking partners report higher positive antecedents and lower negative antecedents of smoking when compared to individuals with nonsmoking partners.

Methods

Participants and Procedure

Participants were eligible if they self-reported: (1) smoking cigarettes, (2) being ≥ 18 years of age, (3) being fluent in English, and (4) living with a romantic partner for at least one month. Our final sample included 123 participants (one partner smokes: $n = 60$, both partners smoke: $n = 63$). Data were collected from July to December of 2013.

Participants were recruited through SocialSci, an online participant database that was created exclusively for academic research that has since ceased operations. SocialSci actively recruited participants living in the U.S. through websites and social media and tracked participant responses to demographic questions over time across different studies. This allowed for the detection of participant inconsistencies and removal of participants who answered randomly or untruthfully. We provided SocialSci with our inclusion criteria and their personnel made the survey available to eligible participants on its website. Participants completed an online consent form and were then directed to the survey which took approximately 20 minutes to complete. Participants' answers to the survey were anonymous and no identifiable information was collected. Participants received 50 points through the SocialSci website that could be redeemed for gift cards.

The survey included the measures discussed below, as well as survey items designed to assess smoking patterns in participants with partners who smoke versus participants with nonsmoking partners. Tooley and Borrelli (2017) provide more information about these smoking characteristics.

Measures

Socio-demographic and Smoking Variables

We collected socio-demographic information including age, gender, ethnicity, employment, and income. Participants self-reported the number of cigarettes they smoked per day during a typical week. The sum of two items (#1 and #4 referred to as the "heaviness of smoking index") from the Fagerstrom Test for Nicotine Dependence (FTND; Heatherton et al., 1991) assessed nicotine dependence; a score of ≥ 4 indicates high nicotine dependence (de Leon et al., 2003).

Relationship Satisfaction

The Kansas Marital Satisfaction Scale (Schumm et al., 1986), used in another study of partnered individuals who smoke (Regan Sterba et al., 2011), assessed relationship satisfaction with three items that are scored on a scale of 1 (extremely dissatisfied) to 7 (extremely satisfied). Higher scores indicate higher relationship satisfaction. This scale demonstrated high internal consistency in previous studies ($\alpha = 0.92$, Regan Sterba et al., 2011; $\alpha = 0.94$ and $\alpha = 0.97$, Mousavi, 2020; $\alpha = 0.92$, Holden et al., 2022) and in the current study ($\alpha = 0.97$). The KMSS also demonstrates convergent validity with measures of marital instability and in a study using a sample of military personnel, KMSS scores reliably predicted participants describing their marriage as not being in

trouble, as being in trouble, or that they would be divorcing (Schumm et al., 2008).

Psychosocial Smoking Variables

Dyadic Efficacy for Smoking Cessation is an 8-item scale for individuals who smoke that assessed confidence in their ability to work with their partner to quit smoking and cope with challenges related to quitting. Higher scores indicate higher confidence. This scale demonstrated high internal consistency ($\alpha = 0.92$) and construct validity in previous studies (Regan Sterba et al., 2011) and in the current study ($\alpha = 0.96$). “Smoking Outcome Expectancies” were assessed with the 25-item Brief Smoking Consequences Questionnaire-Adult (BSCQ-A; Rash & Copeland, 2008) which has 10 scales: (1) negative affect reduction, (2) stimulation/state enhancement, (3) health risks, (4) taste/sensorimotor manipulation, (5) social facilitation (i.e., the degree to which cigarettes facilitate/enhance social situations), (6) weight control, (7) craving/addiction, (8) negative physical feelings, (9) boredom reduction, and (10) negative social impression (Rash & Copeland, 2008). Higher scores on each subscale indicate greater endorsement of that consequence. The BSCQ-A has shown good internal consistency ($\alpha = 0.79$) and convergent validity in previous studies (Rash & Copeland, 2008) and good internal consistency ($\alpha = 0.87$) in the current study. The Brief Wisconsin Inventory of Smoking Dependence Motives (WISDM; Smith et al., 2010) assessed smoking motives related to: (1) affiliative attachment, (2) automaticity, (3) loss of control, (4) cognitive enhancement, (5) craving, (6) cue exposure, (7) affective enhancement, (8) social/environmental goods, (9) taste, (10) tolerance, and (11) weight control. Higher scores on each subscale indicate greater endorsement on that motive. These subscales

can be combined into two synthetic scales, Primary Dependence Motives (PDM), which is the mean of the automaticity, loss of control, craving and tolerance subscales, and Secondary Dependence Motives (SDM), which is the mean of the remaining subscales. The Brief WISDM shows evidence for predictive and concurrent validity and good internal consistency (Cronbach’s α above 0.8) on most subscales across three samples (Smith et al., 2010). In the current study, all subscales showed good to excellent internal consistency with Cronbach’s α ranging from 0.84 to 0.95, except for Cue Exposure ($\alpha = 0.78$), and excellent internal consistency for both PDM ($\alpha = 0.97$) and SDM ($\alpha = 0.94$). “Motivation to quit” assessed current desire to quit smoking on a scale from 1 (do not want to quit) to 10 (very much want to quit).

Relationship Antecedents of Smoking (RAS)

This scale, developed for the current study, includes 21 items with both positively- and negatively-valenced antecedents. Items were developed through our consultation with colleagues involved in smoking research. We specifically attempted to develop both positively-valenced and negatively-valenced items that fell across a variety of different relationship-specific contexts. Participants rated the frequency (never, rarely, sometimes, often, always) with which they have felt like smoking in relationship-related situations in the last month. These include both positively-valenced situations and negatively-valenced situations (Table 1). Higher scores on the total scale indicate higher endorsement of relationship-related antecedents. Higher scores on the positive subscale indicates higher endorsement of positively-valenced antecedents and higher scores on the negative subscale indicates higher endorsement of negatively-valenced antecedents.

Data Analysis

Sample demographic variables were described using the percentage frequencies or their means and standard deviations. We used principal component analysis (PCA) with a varimax rotation (Kaiser, 1958) to examine the dimensionality of the RAS instrument based on guidance provided by the parallel analysis procedure (Horn, 1965). A measure of internal consistency reliability, Cronbach's α statistic, was calculated for the final version of the total measure and the derived subscales. Pearson correlation analyses were conducted to examine the association between the RAS subscales and the relationship, psychosocial, and smoking variables. One-way ANOVAs assessed the difference between participants with smoking partners and participants with

nonsmoking partners on their reported positive and negative antecedents.

Results

Sample Characteristics

Participants (63.9% women) were, on average, 32 years old ($SD = 8.9$) and were 83.8% white, 6.5% African-American, 5.7% Asian, and 4% other; 6.5% of participants reported Hispanic ethnicity. Most were employed full or part time (68.3%) and 40.7% reported a yearly household income of $> \$65,000$. Participants smoked, on average, 10.1 cigarettes per day ($SD = 7.5$) and reported moderate levels of nicotine dependence ($M = 1.7$, $SD = 1.8$), and motivation to quit smoking ($M = 6.1$, $SD = 2.8$).

Table 1

RAS Items and Subscale and Factor Loadings

	Factor Loading
Positive Subscale Items	
I feel like smoking when I am having a pleasant conversation with my partner	.81
I feel like smoking when I am watching television with my partner	.66
I feel like smoking when my partner and I are celebrating something	.70
I feel like smoking after my partner and I have sex	.62
I feel like smoking when I am relaxing with my partner	.87
I feel like smoking when I am doing something fun with my partner	.88
Negative Subscale Items	
I feel like smoking when I have a conflict with my partner	.72
I feel like smoking when my partner criticizes my smoking	.82
I feel like smoking when I feel like I have let my partner down	.79
I feel like smoking when my partner criticizes me	.90
I feel like smoking when I have difficulty expressing my feelings to my partner	.67
I feel like smoking when my partner acts like he/she does not care about me	.86
I feel like smoking when I feel that my partner does not understand my needs or desires	.86
I feel like smoking when I feel "trapped" in my relationship	.70
I feel like smoking when I am angry with my partner	.79
I feel like smoking when I am not happy with my role in my relationship with my partner	.80
I feel like smoking when my partner does not meet his/her responsibilities	.77
I feel like smoking when my partner nags me about something	.85
I feel like smoking when my partner tries to persuade me to quit smoking	.79
I feel like smoking when my partner nags me about my smoking	.83

Dimensional Analysis and Internal Consistency

Based on the Parallel Analysis procedure (Vivek et al., 2017) and the visual examination of the scree plot, a two-component solution was judged the best dimensional solution. This 2-factor model explained 68.4% of the total variance with item loadings that ranged from .62 to .90. The final PCA solution kept 20 of the original 21 items (6 positive and 14 negative), with one item (“I feel like smoking when my partner and I drink alcohol”) removed due to a low item loading (< .40) on its theorized subscale. Cronbach’s α indicated excellent internal consistency for the total scale ($\alpha = 0.96$) and for the positive ($\alpha = 0.88$) and negative ($\alpha = 0.97$) subscales. Table 1 presents the final 20 items and factor loadings.

Construct Validity

Smoking and Relationship Variables

Higher scores on the positive RAS subscale were associated with lower motivation to quit ($r = -.19, p = .04$) and

higher nicotine dependence scores (HSI; $r = .48, p < .001$). Higher scores on the negative RAS subscale were associated with higher nicotine dependence scores ($r = .41, p < .001$), lower relationship satisfaction (KMSS; $r = -.31, p < .001$), and lower dyadic efficacy to quit smoking ($r = -.23, p = .02$). Table 2 shows the correlation matrix for the RAS negative and positive subscales and motivation to quit, nicotine dependence, relationship satisfaction, and dyadic efficacy to quit smoking.

Psychosocial Smoking Variables

Brief Smoking Consequences Questionnaire-Adult. Higher scores on the positive RAS subscale and the negative RAS subscale were each positively associated with all of the subscales of the BSCQ-A except for the Health Risks and the Negative Social Impressions subscales. Table 3 shows the correlation matrix for the RAS positive and negative subscales and the subscales of the BSCQ-A.

Table 2
Correlation Matrix between RAS Subscales and Smoking and Relationship Variables

Variable	1	2	3	4	5	6
1. RAS_Pos	-					
2. RAS_Neg	.52**	-				
3. Mot	-.19*	-.03	-			
4. HSI	.48**	.41**	-.16	-		
5. KMSS	.01	-.31**	.12	.01	-	
6. DE	-.06	-.23*	.21*	-.15	.47**	-

Note.

Mot refers to motivation to quit smoking; HSI refers to Heaviness of Smoking Index which measures nicotine dependence; KMSS refers to Kansas Marital Satisfaction Scale which measures relationship satisfaction; DE refers to dyadic efficacy to quit smoking.

Table 3
Correlation Matrix between RAS Subscales and BSCQ-A Subscales

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. RAS_Pos	-											
2. RAS_Neg	.52**	-										
3. BSCQ-Neg Affect	.28**	.55**	-									
4. BSCQ-Stim	.31**	.25**	.23*	-								
5. BSCQ-Health Risk	-.12	.05	.32**	.02	-							
6. BSCQ-Taste	.37**	.34**	.28**	.34**	-.13	-						
7. BSCQ-SocialF	.41**	.51**	.53**	.42**	-.05	.35**	-					
8. BSCQ-WeightC	.25**	.25**	.23*	.47**	.02	.24*	.32**	-				
9. BSCQ-Craving	.28**	.43**	.45**	.22*	.32**	.07	.20*	.25**	-			
10. BSCQ-Neg Physical	.28**	.43**	.45**	.22*	.32**	.07	.20*	.25**	1.00**	-		
11. BSCQ-Bored	.36**	.46**	.52**	.39**	.20*	.31**	.45**	.32**	.31**	.31**	-	
12. BSCQ-Neg Social Imp	-.07	.05	.05	.07	.25**	-.11	.13	.22*	.17	.17	.11	-

Brief Wisconsin Inventory of Smoking Dependence Motives (Brief WISDM). Higher scores on the positive RAS subscale and the negative RAS subscale were each positively associated with all of the subscales of the Brief WISDM and the 2 synthetic scales, the PDM and the SDM. Table 4 shows the correlation matrix for the RAS positive and negative subscales and the subscales of the Brief WISDM and the PDM and SDM.

Differences between Smoking Concordant and Discordant Couples. To investigate whether these relationships looked different between participants with a partner who smokes versus participants with

a partner who does not smoke, we first calculated the interaction between participant group (partner smokes vs. partner doesn't smoke) and each of the RAS subscales. We then examined the association between the interaction terms and each of the smoking, relationship, and psychosocial smoking variables.

The interaction between group and RAS negative subscale score was significantly associated with the BSCQ-A subscale score of boredom reduction. Whereas negative RAS was positively and significantly associated with boredom reduction in both groups, the correlation was stronger in those with partners who do not smoke ($r = .47, p <$

.001) versus those with partners who smoke ($r = .27, p = .04$). Also, higher negative RAS was significantly associated with lower relationship satisfaction in both groups; however, this relationship was stronger between those with partners who smoke ($r = -.41, p = .002$) versus those with partners who do not smoke ($r = -.29, p = .03$)

The interaction between group and positive RAS subscale score was significantly associated with the affiliative attachment score of the WISDM. For those with nonsmoking partners, there was a statistically significant and positive correlation between RAS positive and affiliative attachment ($r = .39, p = .003$), but the correlation was not statistically significant for participants with partners who smoke ($r = .25, p = .06$). There was also an association between the interaction between group and positive RAS for the negative affect reduction and boredom reduction subscales of the BSCQ-A. For those with partners who do not smoke, there was a statistically significant, positive correlation between RAS positive and negative affect reduction ($r = .42, p = .001$) but the correlation for participants with partners who smoke was not statistically significant ($r = .22, p = .10$). Also, the relationship between RAS positive and boredom reduction was stronger for those with partners who do not smoke ($r = .55, p < .001$) compared to those with smoking partners ($r = .41, p < .001$).

Discussion

The RAS displayed excellent reliability and initial evidence of construct validity. Confirming our hypotheses, participants with smoking partners reported higher positive antecedents and lower negative antecedents of smoking when compared to participants with nonsmoking partners. Individuals who smoke and have smoking partners (smoking concordant couples) and individuals who

smoke with nonsmoking partners (smoking discordant couples) often differ significantly in their smoking behavior, attitudes, and patterns (Tooley & Borrelli, 2017). We did remove one item related to smoking and alcohol use due to low factor loading. It may be useful to examine other shared couple triggers that are not necessarily positively- or negatively-valenced (for example, parenting or other responsibilities) that may influence smoking as an additional subscale.

Higher RAS positive subscale scores were associated with lower motivation to quit smoking and higher nicotine dependence. Those who smoke in positive relationship-related situations may be less motivated to quit, perhaps due to experiencing more social cues to smoke. They also may be more addicted to nicotine due to their shared smoking triggers and higher exposure to nicotine through their own cigarette smoke and exposure to the cigarette smoke of their partners as partners in smoking concordant couples are more likely to smoke together (Tooley & Borrelli, 2017).

Higher RAS negative subscale scores were related to lower ratings of relationship satisfaction and lower dyadic efficacy to quit smoking. Individuals who smoke in response to negative relationship-related situations may be less satisfied with their relationships overall and may be less interested in working with their partners to overcome their smoking. This fits with the work of Regan Sterba et al. (2011) who found that higher dyadic efficacy was associated with higher relationship satisfaction, behaviors supportive of quitting smoking, and self-efficacy to quit smoking. It may be important to target the provision of healthy support for quitting, working together as a team, and strategies to improve the quality of the relationship in couples with a lot of negative relationship-specific smoking antecedents.

Table 4*Correlation Matrix between RAS Subscales and Brief WISDM Subscales and SDM and PDM*

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. RAS_Pos	-														
2. RAS_Neg	.52**	-													
3. WISDM-Aff Att	.29**	.42**	-												
4. WISDM-Automat	.39**	.44**	.57**	-											
5. WISDM-Loss Contr	.42**	.53**	.71**	.78**	-										
6. WISDM-Cog Enhan	.42**	.51**	.67**	.69**	.85**	-									
7. WISDM-Craving	.33**	.51**	.62**	.73**	.87**	.75**	-								
8. WISDM-Cue Expos	.31**	.43**	.53**	.58**	.68**	.70**	.74**	-							
9. WISDM-Soc Env Go	.27**	.20*	.36**	.37**	.35**	.36**	.41**	.28**	-						
10. WISDM-Taste/ Sens	.30**	.31**	.28**	.34**	.29**	.43**	.23*	.19*	.38**	-					
11. WISDM-Tolerance	.48**	.48**	.64**	.74**	.79**	.72**	.75**	.43**	.44**	.38**	-				
12. WISDM-Weight Cont	.27**	.25**	.59**	.39**	.47**	.54**	.39**	.42**	.25**	.15	.39**	-			
13. WISDM Aff Enhance	.46**	.59**	.62**	.58**	.63**	.79**	.61**	.61**	.38**	.53**	.58**	.48**	-		
14. WISDM-PDM	.45**	.55**	.69**	.89**	.94**	.83**	.92**	.65**	.41**	.33**	.90**	.43**	.65**	-	
15. WISDM-SDM	.45**	.54**	.80**	.68**	.77**	.88**	.73**	.71**	.61**	.58**	.71**	.68**	.86**	.78**	-

Interestingly, both high scores on the positive subscales and on the negative subscales were related to higher WISDM subscale scores, primary and secondary dependence motives, and positive outcome expectancies for smoking. Individuals who report more relationship-related cues to smoke tend to see more benefits of smoking across various contexts and report more motives to smoke overall. However, relationship-specific antecedents and motives to smoke are not explicitly covered in these standard smoking assessments. It may be useful to consider relationship-related antecedents as another dimension of these constructs and may provide further avenues for treatment in couples in which one or both partner smokes.

Lastly, as previous research has found that smoking concordant and discordant couples differ in their smoking behavior and attitudes, it is important to examine how the relationship between RAS and other smoking variables may differ between these different couples. Higher negative RAS was significantly associated with lower relationship satisfaction in both participants with partners who smoke (smoking concordant) and participants with partners who do not smoke (smoking discordant); this association was stronger in participants in smoking concordant relationships. It may be that higher negative RAS is actually a bigger red flag for smoking concordant couples, because in general, smoking concordant couples use smoking in more ways to benefit the relationship. However, negative RAS is related to poorer relationship quality in both groups and should be addressed in smoking cessation interventions that include partners. Higher negative RAS was significantly associated with higher use of cigarettes for boredom reduction in both groups, but this relationship was stronger in participants with a nonsmoking partner. Again, although it is important to address the use of smoking for

boredom reduction in both smoking concordant and discordant couples, it may be useful to target this point specifically in smoking discordant couples.

On the other hand, higher positive RAS was significantly associated with higher affiliative attachment (a strong emotional attachment to smoking) in participants with a nonsmoking partner. This relationship was not statistically significant (although trended towards significance) in participants with smoking partners. Perhaps in smoking discordant couples, smoking after positive relationship experiences leads to a stronger connection with smoking itself. It is important to address this in interventions by finding other ways to celebrate positive relationship experiences. For participants with non-smoking partners, we also found a significant positive relationship between RAS positive antecedents and the use of cigarettes to reduce negative affect. This relationship was not statistically significant in participants with smoking partners. Higher positive RAS was also significantly associated with higher use of cigarettes for boredom reduction in both groups, but this relationship was stronger in participants with a nonsmoking partner. It may be that having higher positive antecedents for smoking may lead to more favorable expectations of smoking in other situations. It would be useful to pay careful attention to these outcome expectancies in smoking cessation interventions for couples and the unique ways they may operate in smoking concordant versus discordant couples.

It is important to note that because the data were collected for this study in 2013, the smoking landscape has changed significantly. Data from the 2017-2018 National Health Survey indicated that about 5.3 million employed, adult Americans reported using electronic cigarettes and about half of these reported using combustible cigarettes concurrently (Syamlal et al., 2021).

Future research should measure and examine e-cigarette and dual combustible and e-cigarette use in couples.

Implications for Health Behavior Research and Practice

Using a cognitive-behavioral family systems model to conceptualize smoking behavior (McCrary et al., 2012), identifying and targeting relationship-focused triggers for smoking may lead to more effective smoking cessation interventions for couples in which one or both partners smoke. Those triggered to smoke during positive relationship experiences may benefit from interventions that attempt to replace these triggers with other valued relationship-related activities. For example, if an individual enjoys smoking as a means to celebrate with their partner, identifying new ways for the couple to celebrate may help to ease their urge to smoke. Those triggered to smoke in negative relationship situations may benefit from more couple-focused work, which may increase relationship satisfaction and reduce triggers to smoke. This also may increase their dyadic efficacy to quit, i.e., seeing their partner as an ally in their attempt to quit. Previous research indicates that higher dyadic efficacy predicts a higher likelihood of abstinence at seven and 30 days after a quit attempt (Regan Sterba et al., 2011). According to our results, it also may be important to include components of general couples therapy to improve relationship satisfaction.

Limitations

As this was a pilot study, there are several limitations worth noting. First, we used a relatively small convenience sample of participants. Second, only one partner in the couple was surveyed. Researchers in future studies should utilize dyadic data, collecting

data on these variables from both partners. Third, this was a cross-sectional study in which data were collected at one time-point. Fourth, this study only examined construct validity of the RAS. Future research should examine predictive and concurrent validity of the RAS in larger samples. Also, as the survey company used in the current study has since shut down, it is important to replicate these findings in other samples. Lastly, the correlation coefficients we obtained between the RAS and the different measures to examine construct validity fell more in the small to moderate range, which is lower than what is typically accepted to establish construct validity. However, we believe this provides initial support for preliminary validity of the RAS and should be investigated further.

Conclusions

Our findings indicate initial evidence for the reliability and validity of the RAS as a measure of positive and negative relationship-related smoking antecedents. Whereas this pilot study had several limitations, it is the first to examine relationship-related antecedents in smoking couples. Future research should examine the RAS as a mediator specifically targeted by smoking cessation interventions in predicting success in quitting smoking over time.

Discussion Questions

We propose several suggestions for ways to tailor smoking cessation interventions based on positive and negative relationship-focused antecedents. *In what other ways should smoking cessation interventions be tailored to couples? In other words, how should these couple interventions be different from the typical individual-centered smoking interventions?*

Our research focuses on the smoking antecedents that impact couple smoking behavior. Cognitive-behavioral family systems theories also posit the importance of shared consequences of a substance use behavior in romantic relationships. *What might some of these shared smoking consequences be, both positive and negative, that should be addressed in smoking cessation interventions?*

Ethical Approval Statement

All study procedures were approved by our institution's review board.

Potential Author Conflicts

The authors have no conflicts of interest to declare.

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