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Validity and Reliability of the Nicotine and Marijuana Interaction Expectancy (NAMIE) Questionnaire

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Abstract

Background—The co-occurring use of tobacco and marijuana among young people is a concern, yet little research has examined processes of co-use. Understanding expectancies around use of the two substances will help identify intervention targets. This study examined psychometric properties of the Nicotine and Marijuana Interaction Expectancy (NAMIE) questionnaire based on three modified scales of the Nicotine and Other Substance Interaction Expectancy (NOSIE) questionnaire.

Method—An anonymous online survey recruited participants (N=1152) age 18 to 25 (mean age 20 years, 67% male, 72% Caucasian) who reported use of cigarettes and marijuana in the past 30 days. Analyses examined reliability and validity of the NAMIE.

Results—A confirmatory factor analysis indicated good model fit for a 3-factor model. Scales were marijuana increases tobacco use and urges, tobacco increases marijuana use and urges, and smoking to cope with marijuana urges. Subscales correlated significantly with measures of cigarette smoking ($r = .08$ to $.27$, $p<.01$) and nicotine dependence ($r = -.07$ to $-.20$, $p<.01$), marijuana use ($r = .08$ to $.29$, $p<.01$) and dependence ($r = .27$ to $.42$, $p<.01$), percent of days using both cigarettes and marijuana in the past 30 days ($r = .15$ to $.30$, $p<.01$), thoughts about tobacco and marijuana abstinence ($r = -.09$ to $.44$, $p<.01$), and motivation to quit using marijuana ($F = 9.43$, $p<.001$). When entered into a regression model, variables of use and thoughts about use remained significant.

Conclusions—The NAMIE was well-adapted for use with a marijuana-using community sample of young adult smokers.

Keywords

tobacco; marijuana; interaction expectancies; young adults; Internet; NAMIE; NOSIE

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1. INTRODUCTION

People who use marijuana also tend to smoke cigarettes (Agrawal et al., 2008). Our systematic review of 163 studies published between 1999 and 2009 found that 85% of relationships studied indicated a significant, positive association between tobacco and marijuana use among youth and young adults (Ramo et al., 2012b). Few studies sought to intervene on tobacco and marijuana use, and findings were mixed. A better understanding of the interplay of tobacco and marijuana use is needed to aid intervention development.

From a social cognitive perspective, understanding expectancies of the interaction between smoking and substance use may help identify perceived barriers to quitting and inform strategies for treatment engagement (Rohsenow et al., 2005). For this purpose, Rohsenow et al. (2005) developed the Nicotine and Other Substance Interaction Expectancies Questionnaire (NOSIE) to measure expectancies regarding the interaction between use of tobacco and other substance use. In the NOSIE development study of 160 patients from an inner-city residential substance abuse treatment program, Rohsenow et al. (2005) found that substance abuse consistently correlated with increased tobacco use and urges to smoke, while tobacco use increased substance use behavior and urges much less frequently. In a follow-up study with 162 veterans enrolled in a clinical trial for smoking cessation, Carmody et al. (2012) found similarly that participants expected smoking to have less of an impact on substance use than substance use has on smoking. In both studies, type of substance was not specified.

The NOSIE has not been evaluated with respect to a specific substance such as marijuana nor among young adults. Given that tobacco and marijuana are both smoked substances and their use is common among young people (Tullis et al., 2003), there is reason to believe that thoughts about the relationship between these two substances would be strong.

The primary objective of the present study was to adapt the NOSIE to pertain to tobacco and marijuana use (the "NAMIE") and evaluate its use in a community sample of young adult smokers who also smoke marijuana. Specifically, we sought to confirm the 3-factor structure of the NAMIE based on three of the four original NOSIE scales with young adults and investigate relationships between tobacco-marijuana use interaction expectancies and 1) various indices of concurrently measured tobacco and marijuana use; 2) days co-using tobacco and marijuana; 3) thoughts about abstinence for tobacco and marijuana; and 4) tobacco and marijuana stages of change.

2. METHODS

2.1 Participants and Procedure

Participants were English-literate young adult tobacco users age 18 to 25 recruited via an anonymous online survey. Those who reported use of cigarettes and marijuana in the past 30 days were included in the present analyses. Recruitment and data collection procedures have been described in detail previously (Ramo et al., 2012a, 2010; Ramo and Prochaska, 2012). Of the 3748 cases that met criteria for survey completion (participants between the ages of 18 and 25, who smoked at least one cigarette in the past 30 days), 1987 (53%) completed the survey. Of those, included for the current study were 1152 (58%) participants who indicated on two separate measures that they had used marijuana at least once in the past month.

2.2 Measures

2.2.1 Nicotine and marijuana interaction expectancies—We adapted three of the original four scales (14 of the original 20 items; Table 1) of the NOSIE Questionnaire (Rohsenow et al., 2005) to make them specific to the interaction between tobacco and

marijuana. Participants rated statements about tobacco and marijuana use on a scale from 1 ("never") to 5 ("always"). Scales were: 1) the effects of marijuana use on smoking; 2) the effects of smoking on marijuana use; and 3) smoking cigarettes to cope with urges to use marijuana. As this was a non-treatment seeking community sample, we did not examine the fourth NOSIE scale regarding receptivity to smoking cessation during substance abuse treatment.

2.2.2 Tobacco use—Timeline Followback procedures (Brown et al., 1998) assessed the number of cigarettes smoked per day and the number of days smoking any cigarettes in the past 30 days. Participants were shown a calendar from the previous two months with major holidays and asked to select the number of cigarettes and alcoholic drinks or whether they used marijuana or another drug each day in the 30 days prior to the survey. This online version has demonstrated reliability and validity for assessing tobacco use in young adult smokers (Ramo et al., 2011). A smoking questionnaire assessed participants' years of smoking, age of first and regular tobacco use, and past year quit attempt (y/n; Hall et al., 2006). One item from the Fagerstrom Test for Nicotine Dependence measured time to first cigarette upon waking (TTFC; Baker et al., 2007), scored from 0 ("after 60 minutes") to 3 ("within 5 minutes").

2.2.3 Marijuana use—Items from the 2008 National Survey of Drug Use and Health (NSDUH; Harrison et al., 2007) assessed past month marijuana use, age of onset of marijuana use and past year marijuana quit attempt (y/n). The TLFB for marijuana use (Sobell and Sobell, 1996) was used to calculate frequency of past 30-day marijuana use.

Marijuana dependence symptoms were assessed initially with the Cannabis Use Disorder Identification Test (CUDIT; range: 0-40; Adamson and Sellman, 2003) and then switched after 8 months of recruitment (n = 770) to the recommended 8-item Cannabis Use Disorder Identification Test-Revised (CUDIT-R; range: 0-32; Adamson et al., 2010). Items assessed frequency of cannabis use, length of time high from cannabis on a typical day of use, and problems from cannabis use. Items were scored from 1 (e.g., "never") to 4 (e.g., "daily or almost daily"). As scale total scores were slightly different for the two measures, CUDIT and CUDIT-R scores were converted to z-scores and pooled.

2.2.4 Tobacco and marijuana co-use—The Timeline Followback was used to compute the percent of days using both tobacco and marijuana out of total days using either substance.

2.2.5 Thoughts about tobacco and marijuana—The 21-item Smoking Consequences Questionnaire-Short form (S-SCQ; Myers et al., 2003; Ramo et al., 2011) measured smoking-related outcome expectancies (range: 0-189; Cronbach's alpha = .90). Responses were scored on a 10-point Likert-type scale from 0 ("completely unlikely") to 9 ("completely likely"). The 12-item Marijuana Craving Questionnaire – Short Form (MCQ-SF) assessed marijuana cravings on a 7-point Likert-type scale from 1 ("strongly disagree") to 7 ("strongly agree"). The Thoughts about Abstinence scales (Hall et al., 1990) assessed desire to quit, abstinence self-efficacy, and perceived difficulty of quitting tobacco and marijuana (each scored on a scale from 1 to 10). Abstinence goals were categorized as total sustained abstinence or non-abstinence. Stages of Change Questionnaires for tobacco and marijuana (Prochaska and DiClemente, 1983) assessed pre-action stages of Precontemplation: no intention to quit within the next 6 months; Contemplation: intention to quit within the next 6 months but no 24-hr quit attempt in the past year; and Preparation: intention to quit within the next month and a 24-hr quit attempt in the past year.

3. RESULTS

3.1 Sample characteristics

The study sample had a mean age of 20.4 (SD = 2.1) years, was 67.4% male, with 72.0% identified as Caucasian, 3.0% African American, 3.0% Asian, 5.8% Hispanic/Latino, and 16.2% multiracial or another ethnicity. Participants had on average 13.2 (SD = 2.1) years of education and 27.5% were employed full time, 16.7% part-time, 24% unemployed, and 29.2% were currently students. Participants smoked on average 7.6 cigarettes per day (SD =6.9), used tobacco 22.7 days in the past month (SD = 11.2), 37.6% smoked their first cigarette within 30 minutes of waking, and 67.9% smoked daily. Participants used marijuana on 13.8 days (SD = 12.5) in the past month, averaged 10.4 (SD = 7.4) on the CUDIT and 11.6 (SD=6.4) on the CUDIT-R, and 21.7% used marijuana daily. Participants had used tobacco and marijuana together on 14.1 (SD=11.7) days in the past month. Highest means on the NOSIE-3MJ scale were on Scale 1, followed by Scale 2, and Scale 3 (Table 1).

3.2 Tobacco-marijuana interaction expectancies

A confirmatory factor analysis was conducted using Mplus v.2.13 software (Muthén and Muthén, 2011) to examine the fit of the 3-factor structure of the NAMIE in this sample of young adults. All analyses used the maximum likelihood method with robust errors and the Satorra-Bentler chi-square statistic (Satorra and Bentler, 1994) to account for non-normal distribution of data. The three factor model fit the data well (χ^2 = 691.77, p<.001; χ^2/d.f. = 9.3, RMSEA = .09; CFI = .95; SRMR = .05). Factor loadings for each item and Cronbach's alpha for each scale are presented in Table 1.

3.3 Association of interaction expectancies with tobacco and marijuana use, thoughts about use, and stage of change

Correlations and ANOVA were used to examine univariate relationships between each of the three interaction expectancy subscales and measures of tobacco and marijuana use and thoughts about use. There were a number of significant relationships between NAMIE subscales and tobacco and marijuana use variables (Table 2). Moderate effects sizes (r >= .30) were seen between scale 1 (tobacco increasing marijuana use/urges) and marijuana dependence symptoms (CUDIT total scores), days using tobacco and marijuana, and expected difficulty with quitting marijuana use. There was also a moderate effect size between scale 2 (tobacco increases marijuana use and urges) and marijuana expectancies (MCQ-SF), and scale 3 (smoking to cope with marijuana urges) and marijuana dependence symptoms (CUDIT total scores). The three scales did not correlate with past year tobacco or marijuana quit attempts. Examination of NAMIE subscales by stage of change found that those in the preparation stage of change for quitting marijuana (M = 2.27, SD = 1.29) had greater expectations that smoking cigarettes could be used to cope with marijuana urges than those in the precontemplation (M = 1.75, SD = 1.02; p<.001) or contemplation (M = 1.86, SD = .99, p=.048; model F = 9.43, p<.001) stages of change for quitting marijuana.

Three multiple regression models examining predictors of the three NAMIE subscales based on significance in univariate analyses are presented in Table 2b. All three models were significant and explained between 18% (scale 3) and 30% (scale 2) of variance in NAMIE scale scores. Significant correlates of scale 1 were days smoking, days using marijuana, marijuana dependence (CUDIT), percent of days co-using tobacco and marijuana, smoking expectancies (S-SCQ), desire to stop smoking, and expected difficulty to remain marijuana-free. Significant correlates of scale 2 included CUDIT, S-SCQ, MCQ-SF, and expected success to stop using marijuana. Significant correlates of scale 3 included days using marijuana, CUDIT, MCQ-SF, desire to stop using marijuana, and expected difficulty to remain marijuana-free.

4. DISCUSSION

This study provides support for the validity of the Nicotine and Marijuana Interaction Expectancy (NAMIE) questionnaire in a non-treatment seeking community sample of young adult tobacco and marijuana users. The three scales demonstrated utility in evaluating expectancies of the interaction of tobacco and marijuana for a non-treatment population.

Expectations regarding the interaction of tobacco and marijuana use (Scales 1-3) were lower in our sample than reported in other studies with the original NOSIE (Carmody et al., 2012; Rohsenow et al., 2005). Young adults in the community who use both tobacco and marijuana may be more receptive to an intervention targeting both substances than older adults who use tobacco and other drugs of abuse. This is consistent with findings with adolescents that treating tobacco dependence in the context of substance abuse treatment has promise for both tobacco and other drug outcomes (Myers and Brown, 2005; Myers and Prochaska, 2008).

As hypothesized, young adults who used more tobacco and marijuana and used both substances in the same day generally held higher expectancies of interaction of these substances. Further, reports of smoking cigarettes to cope with marijuana urges to use were greater among young adults desiring and preparing to quit marijuana, yet possessing greater marijuana craving, perceiving lower expected success and greater difficulty in achieving marijuana abstinence. Having made a prior quit attempt did not affect expectations. Substituting tobacco for marijuana may be a common strategy to cope with marijuana urges among young adults who want to quit but do not have tools to do so, regardless of whether they have tried in the past. Interventions for marijuana use among young people should assess tobacco use and urges to use during treatment and focus on finding healthier substitutes than cigarettes to cope with urges.

This study had limitations due to its cross-sectional design resulting in inability to make causal inferences about tobacco and marijuana expectancies. Prospective studies are needed. Second, the large number of analyses introduced the risk of Type I error and some of the correlations represented significant but small effects (e.g., some $r<.10$). However, many of the effect sizes found here were comparable to those found by Rohsenow et al. (2005; $r=.13$ to .34). Finally, future studies should assess interaction expectancies in relation to use by mixing tobacco and marijuana (e.g., joints, blunts).

There is a growing body of research identifying links between tobacco and marijuana use (Agrawal et al., 2012; Ramo et al., 2012b). As research turns to treating the co-use of tobacco and marijuana, it will be important to consider interactions between these substances and target interventions accordingly. A useful tool for those working with individuals who smoke both tobacco and marijuana, the NAMIE provides an indication of the propensity for people to substitute one substance for another and identifies target cognitions to avoid this substitution. A better understanding of expectations young people have about the interactions of tobacco and marijuana use is likely to increase the effectiveness of intervention efforts.

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Table 1

NAMIE Items, factor loadings, scale alphas, and scale means

Subscale (italicized) and items	Factor loading	Scale alpha	Mean (*SD*)
1. Marijuana use increases tobacco use and urges		.90	2.72 (1.27)
It is second nature for me to pick up a cigarette while I am using marijuana.	1.00		
Using marijuana results in wanting a cigarette more.	1.07		
I need a cigarette while I am using marijuana.	.97		
I smoke more while I am using MJ than while I am not actually using.	.83		
I enjoy a cigarette more after I have used marijuana.	.89		
2. Tobacco use increases marijuana use and urges		.66	2.01 (1.02)
Smoking gives me more desire for marijuana.	1.00		
I tend to drink more or use marijuana more after I have had a cigarette.	.78		
If I couldn't have a cigarette my urge to use marijuana would increase.	.91		
3. Smoking to cope with marijuana urges		.95	1.80 (1.07)
I have smoked a cigarette in order to try to decrease my urge to use marijuana.	1.00		
Smoking takes my mind off my urge to use marijuana.	.97		
I have smoked a cigarette instead of using marijuana when I had an urge to use marijuana.	1.03		
I smoke cigarettes to cope with my urge to use marijuana.	.98		
Smoking cigarettes helps me to abstain from marijuana.	.95		
I smoke to take the edge off when I'm feeling a desire for marijuana.	1.00		

Table 2a

Zero–order correlations between NAMIE subscales and tobacco use, marijuana use, and thoughts about tobacco and marijuana

	Marijuana increases tobacco use and urges	Tobacco increases marijuana use and urges	Smoking to cope with marijuana urges
Tobacco use			
Cigarettes usually smoked in 24 hours	.26[**]	.08[**]	.05
Days using, past 30	.27[**]	.10[**]	.08[**]
Years of smoking	.12[**]	.00	-.01
Age first tried cigarettes	-.11[**]	-.04	-.05
Age began smoking regularly (n = 1143)	-.16[**]	-.05	-.05
Quit attempt in past year (% yes)	-.04	-.03	-.01
Time to first cigarette	-.28[**]	-.09[**]	-.05
Marijuana use			
Days using, past 30	.11[**]	.29[**]	.08[**]
Age first tried marijuana	-.12[**]	-.12[**]	-.09[**]
Quit attempt in past year (% yes)	.00	-.09	.05
Cannabis Use Disorder Identification Test	.27[**]	.42[**]	.38[**]
Days co-using tobacco and marijuana, past 30 Thoughts about tobacco use	.25[**]	.30[**]	.15[**]
Smoking Consequences Questionnaire, Short Form	.28[**]	.18[**]	.14[**]
Desire to stop	-.09[**]	-.02	-.01
Expected success to stop	-.21[**]	-.05	-.08[**]
Expected difficulty to stop	.24[**]	.10[**]	.11[**]
Thoughts about marijuana use			
Marijuana Craving Questionnaire Short Form	.22[**]	.44[**]	.24[**]
Desire to stop	-.05	-.12[**]	.09[**]
Expected success to stop	-.12[**]	-.29[**]	-.19[**]
Expected difficulty to stop	.15[**]	.30[**]	.22[**]

Note. Correlations between dichotomous variables (% tobacco or marijuana quit attempt in past year) and NAMIE subscales were computed using Spearman's rho. All other analyses were Pearson's r correlations.

*$p < .05$

[**]
$p < .01$.

Table 2b

Multiple regression models examining predictors of three NAMIE scales

Scales (underlined)/ Variable	B	p	pr	Model R²	Model p
Marijuana increases tobacco use and urges				.28	<.001
Cigarettes smoked per day	.06	.28	.04		
Days smoked, past 30	**.27**	**<.01**	**.13**		
Years smoking	-.01	.75	-.01		
Age first tried cigarettes	.05	.30	.04		
Age began smoking regularly	-.04	.47	-.02		
Time to first cigarette	.07	.11	.06		
Days using marijuana, past 30	**-.10**	**.04**	**-.07**		
Age first tried marijuana	-.03	.51	-.02		
Cannabis Use Disorder Identification Test	**.22**	**<.01**	**.19**		
Percent of days co-using tobacco and marijuana	**.16**	**<.01**	**.09**		
Smoking Consequences Questionnaire – Short form	**.15**	**<.01**	**.13**		
Desire to stop smoking	**-.11**	**<.01**	**-.10**		
Expected success to stop smoking	-.00	.96	.00		
Expected difficulty to remain smoke-free	.04	.06	.06		
Marijuana Craving Questionnaire – Short Form	.06	.18	.05		
Expected success to stop using marijuana	-.02	.64	-.02		
Expected difficulty to remain marijuana-free	**.09**	**.03**	**.08**		
Tobacco increases marijuana use and urges				.30	<.001
Cigarettes smoked per day	.02	.77	.01		
Days smoked, past 30	.04	.41	.03		
Time to first cigarette	.01	.88	.01		
Days using marijuana, past 30	-.09	.11	-.05		
Age first tried marijuana	.01	.89	.01		
Cannabis Use Disorder Identification Test	**.26**	**<.01**	**.21**		
Percent of days co-using tobacco and MJ	.11	.07	.06		
Smoking Consequences Questionnaire – Short form	**.11**	**<.01**	**.10**		
Expected difficulty to remain smoke-free	-.05	.23	-.04		

Scales (underlined)/ Variable	B	p	pr	Model R²	Model p
Marijuana Craving Questionnaire – Short Form	**.26**	**<.01**	**.20**		
Desire to stop using marijuana	.06	.16	.05		
Expected success to stop using marijuana	**-.11**	**<.01**	**-.09**		
Expected difficulty to remain marijuana-free	.09	.03	.08		
<u>Smoking to cope with marijuana urges</u>				.18	<.001
Days smoked, past 30	.06	.18	.05		
Days using marijuana, past 30	**-.21**	**<.01**	**-.12**		
Age first tried marijuana	.00	.97	.00		
Cannabis Use Disorder Identification Test	**.27**	**<.01**	**.22**		
Percent of days co-using tobacco and marijuana	.12	.07	.06		
Smoking Consequences Questionnaire – Short form	.04	.29	.04		
Expected success to stop smoking	.00	.94	.00		
Expected difficulty to remain smoke-free	.00	.98	.00		
Marijuana Craving Questionnaire – Short Form	**.16**	**<.01**	**.13**		
Desire to stop using marijuana	**.11**	**.01**	**.09**		
Expected success to stop using marijuana	-.06	.19	-.05		
Expected difficulty to remain marijuana-free	**.11**	**.01**	**.09**		

Note. All variables significant at the p<.05 level appear in bold. Variables used in each model were based on significant bivariate correlations in Table 2a. Stage of change was not included in any of the models because there were no significantly different NAMIE subscale scores by stage of change.