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Abstinence Expectancies and Quit Attempts

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Abstract

Introduction—Several scales have been developed to measure expectancies about smoking cessation. This secondary analysis tested the reliability and validity of one of the most commonly used expectancy measures - the Perceived Risks and Benefits of Quitting Scale (PRBQ).

Methods—Smokers (n = 143) who planned to quit at some point in the next 3 months entered an observational study in which they called an Interactive Voice Response system nightly for 3 months to report quit attempts and abstinence. They completed the PRBQ at baseline and the end of 1, 2 and 3 months. No treatment was provided.

Results—The Risks scores and Benefit scores of the PRBQ had high internal reliability (alpha = 0.88-0.96 across administrations) and high test-retest stability (ICC = 0.67-0.80), but poor to moderate concurrent validity (correlation with other cessation measures = 0.09-0.52), and poor predictive validity (no significant prediction of quit attempts or duration of abstinence). Results were similar for men and women.

Conclusions—The PRBQ appears to be reliable but, similar to other scales of cessation expectancies, its validity is poor. The face valid notion that expectations influence quitting requires further testing.

Keywords

expectancy; psychometrics; smoking cessation

1. Introduction

Several scales have been developed to measure expectancies about the pros and cons of continuing smoking (Hendricks & Brandon, 2016). Other scales have been developed to

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DECLARATION OF INTERESTS

JH has received grants and consulting fees from many for-profit and nonprofit companies that develop or sell smoking cessation products and services or engage in tobacco control education or advocacy

measure expectancies about smoking cessation (Abrams, Zvolensky, Dorman, Gonzalez, & Mayer, 2011; Macnee & Talsma, 1995; McKee, O'Malley, Salovey, Krishnan-Sarin, & Mazure, 2005; Hendricks, Wood, Baker, Delucchi, & Hall, 2011; Kale, Gilbert, & Sutton, 2015; Dijkstra, De Vries, & Bakker, 1996; Sirota, Rohsenow, Monti, Tidey, & Swift, 2010; Kahler, McHugh, Metrik, & Spillane, 2013; Orleans, Rimer, Cristinzio, Keintz, & Fleisher, 1991; Sorensen & Pechacek, 1986; Sutton, Marsh, & Matheson, 1990). Determining expectancies about smoking cessation could suggest targets for media and clinical interventions; however, this requires knowing which expectancies actually influence quitting. Although several studies have examined the reliability and concurrent validity of quitting expectancy scales (Dijkstra et al., 1996; Hendricks, Wood, & Hall, 2009; Sirota et al., 2010; Kale et al., 2015; Abrams et al., 2011; Hendricks et al., 2011; Kahler et al., 2013; Eklund, Hiltunen, Melin, & Borg, 1997; Lee, Catley, & Harris, 2014; Macnee & Talsma, 1995; McKee et al., 2005; Rohsenow et al., 2015), few have tested whether they predict future quit attempts or abstinence success. During a previously published natural history study (Hughes JR et al., 2014), we collected information on one of the more widely used of these scales - the Perceived Risks and Benefits Questionnaire (PRBQ) (McKee et al., 2005). The current secondary analysis reports on this scale's psychometrics, especially whether the scale prospectively predicts future quit attempts or duration of abstinence.

2. Methods

The methods of our observational study are described in more detail in our prior publications (Hughes JR et al., 2014; Hughes, Naud, Fingar, Callas, & Solomon, 2015). The study was approved by the University of Vermont Committees on the Use of Human Participants and was registered at www.clinicaltrials.gov (NCT00995644).

In 2011-2013, we recruited 152 smokers to a prospective, natural history study on smoking cessation. Major inclusion criteria were: probably or definitely intended to quit sometime within the next 3 months; ≥ 18 years of age; smoked ≥ 10 cigarettes/day for at least 1 year; and did not use other forms of tobacco or nicotine. Across the monthly surveys, 47%-63% stated they planned to quit in the next month.

The study was entirely phone-based and no treatment was provided. Participants called an Interactive Voice Response (IVR) system nightly for 3 months and reported cigarettes/day, quit attempts, and abstinence. At study entry and at the end of the 1st, 2nd and 3rd months, participants completed four surveys. The PRBQ asked participants “to rate how likely each item would be if you were to stop smoking” (e.g. “I will gain weight”) from 1 = no chance to 7 = certain to happen. The scale includes 39 cessation outcomes that are grouped into a Risks scale that is composed of six subscales (each with 2-5 outcomes) and a Benefits scale composed of six subscales (each with 2-5 outcomes) (Table 1). In addition, we used the difference between Benefits and Risks scores to measure a “Difference Score” with positive scores indicating the Benefits were endorsed more than the Risks. Participants also completed a two-question measure of self-efficacy (Dijkstra & de Vries, 2000), a single question of whether the participant planned to quit in next month (Hughes JR et al., 2014), and single-item measure of perceived addiction (Hughes et al., 2004). The self-efficacy score was the average score of two questions: 1) “Please rate how successful you think you would

be if you tried to stop smoking from 1 = would not be successful to 10 = would be successful", and 2) "how difficult would it be to not smoke all day tomorrow" from 1 = very easy to 10 = very difficult. We reverse scored the second question and calculated the mean of the two questions. The addiction question was "Please rate how addicted you are to cigarettes from 1 = not at all addicted to 10 = very addicted". The intent-to-quit question was the yes/no question: "Do you plan to quit in the next 30 days." The self-efficacy (Dijkstra & de Vries, 2000), intention to quit (Hughes JR et al., 2014), and perceived addiction (Hughes et al., 2004) measures have all been shown to have predictive validity; i.e., to predict quitting.

We examined internal reliability of the PBRQ via Cronbach's alpha at each of the four time-points. Test-retest stability was examined by the Intraclass Correlation Coefficient between the score at one time point and the score at the next time-point (i.e., one month later) using an absolute agreement definition. Concurrent validity was measured by the correlation of the PRBQ with the self-efficacy, addiction and intent-to-quit scores at the four measurement times using the Pearson correlation-coefficient for the first two measures and point-biserial correlations for the dichotomous intention measure. For brevity, we present the range of scores for these outcomes across the four measurement times; i.e., baseline and end of 1, 2, and 3 months.

Predictive validity was measured by whether total PRBQ Risk score, total Benefit Scores score, total difference score, and subscale scores prospectively predicted the incidence of a quit attempt of any length, and the duration of abstinence after a quit attempt over the following month, via a multilevel logistic regression. Statistical analyses used SAS v9.4 (SAS Institute, Carey NC) except the ICCs were calculated using SPSSv21 (IBM Corp, Armonk NY).

3. Results

The sample size varied across follow-ups from 143 to 109. Only 3% of non-responses were due to missing data; the others were due to abstinence from smoking at the time of measurement. Most participants (68%) were women and had completed high school (94%). Few (23%) were minorities. Their mean age (sd) was 45 (13), mean cigarettes/day was 21 (9), and mean Fagerstrom Test for Cigarette Dependence (FTCD) score was 5.4 (2.2).

The mean scores on the PRBQ outcomes (total Risks, total Benefits, Difference Score, and the 12 subscale scores) were very consistent across the four measurement times (Table 1). Cronbach's alphas for the total Risks scores and total Benefits scores were very high (0.88-0.96). Cronbach's alphas for 10 of the 12 subscales were above 0.70 across measurement times. Test-retest stability was moderate for the total Risks scores, Benefits scores and Difference scores (ICC = 0.66-0.80). Test-retest correlations for 10 of the 12 subscales were between 0.51- 0.79. Higher total Risks scores were correlated with lower self-efficacy, higher addiction and lower intention to quit scores, and this was true for many of the subscales (Table 1). Higher total Benefits scores and its subscales were not consistently related to self-efficacy, addiction or intention-quit-scores. Higher Difference scores were related to higher self-efficacy and lower addictions scores. Except for one

subscale - loss of enjoyment, neither total Risks scores, total Benefit scores, the Difference scores, nor any of the subscales predicted quit attempts or duration of abstinence in the following month.

4. Discussion

We examined the psychometrics of one of the more widely used scales of expectancies about quitting – the PRBQ. In our analysis, the PRBQ scale had good to excellent internal and test-retest reliability, and adequate concurrent validity; however, it had no predictive validity.

Existing measures of quitting expectancies have been shown to have adequate internal and concurrent validity (Dijkstra et al., 1996; Hendricks et al., 2009; Sirota et al., 2010; Kale et al., 2015; Abrams et al., 2011; Hendricks et al., 2011; Kahler et al., 2013; Eklund et al., 1997; Lee et al., 2014; Macnee & Talsma, 1995; McKee et al., 2005; Rohsenow et al., 2015). The internal and concurrent validity of the PRBQ in our study appears to be similar to or slightly higher than that of these other measures. We are unware of test-retest results for prior scales.

The prior studies of quitting expectancies that examined later quitting have, like our study, found little evidence of predictive validity. The only prior study of predictive validity of the PRBQ was during a test of nicotine medication plus behavior therapy among smokers trying to quit (Yasin, Masilamani, Ming, Koh, & Zaki, 2012). Among the 12 PRBQ items, only the benefit of higher physical attraction predicted 2 month abstinence. A clinical trial conducted in general practice among smokers not ready to quit examined five expected advantages and four expected disadvantages of quitting. Only one advantage (more energy and alertness) and one disadvantage (loss of concentration) predicted future quit attempts, and none of the items predicted abstinence success among attempters (Kale et al., 2015). Another study of smokers not trying to quit found negative expectancies about abstinence predicted a quit attempt but not abstinence, and that positive expectancies predicted neither (Lee et al., 2014). A human laboratory study found abstinence expectancies predicted greater withdrawal symptoms, but did not examine quit attempts or abstinence (Hendricks & Leventhal, 2013).

Expectancies of smoking itself appear to predict abstinence (Hendricks & Brandon, 2016). Why this would not be the case for expectancies of quitting is unclear, especially given that the large majority of smokers have tried to quit (www.gallup.com/poll/1717/tobacco-smoking.aspx) and, thus, have some experiences to form expectancies. One potential reason the PRBQ did not predict quit attempts in our study could be a lack of quit attempts; however, our analyses included 200 quit attempts. On the other hand, only 70% of these attempts in our study lasted more than a day, which could have decreased our ability to predict abstinence. Another possibility is ceiling effects, at least for the benefits scales, where the mean score was 6.2-6.3 on a 7 point scale and this reduction in variability may have decreased sensitivity. Another possibility is that the PRBQ and other scales have not identified several important negative or positive expected outcomes; e.g., the scale does not include some expectancies about several withdrawal symptoms: e.g., anxiety, depression, and insomnia.

Finally, some researchers have developed scales to measure “abstinence phobia” or “detoxification phobia” and these disorders appear to inhibit attempts to stop illicit drug use as well as success among those who try to quit (Schumacher, Milby, Fishman, & Huggins, 1992). These scales differ from the PRBQ in that, they ask the amount of expected “emotional disturbance” from different aspects of detoxification (i.e., they actually do not use the term “fear” or “phobia”). In contrast, the PRBQ simply asks how sure a smoker is that a negative event will occur. Perhaps future expectancy measures should ask how aversive negative aspects are expected to be and how pleasant positive expected events are expected to be, and whether smokers are fearful about stopping or are looking forward to becoming abstinent.

The major limitations of our study include: a) use of a restricted convenience sample, b) tests of concurrent validity limited in number and quality, c) small amounts of prolonged abstinence to predict, and d) no biochemical verification (but see SRNT guidelines (SRNT Subcommittee on Biochemical Verification, 2002)). The major assets include a) tests of internal, test-retest, concurrent, and predictive validity, across repeated assessments, and b) concordance of results across four administrations of the PRBQ.

In summary, that expectancies about the negative and positive facets to abstinence are major factors in determining quit attempts is certainly face-valid; however, our results and those of prior empirical studies have not provided robust empirical confirmation of this belief. Given this, further development of quitting expectancy scales and predictive validity tests are needed.

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Highlights

- Whether expectancies about quitting influence the ability to quit is unclear
- The Perceived Risks and Benefits of Quitting scale had good internal, test-retest and concurrent validity, but did not predict making a quit attempt or duration of abstinence.

Table 1

Range of Psychometric Tests Statistics for PRBQ[a] Across Four Time Points

		Reliability		Concurrent Validity			Predictive Validity	
PRBQ Predictors[c]	**Mean[c]**	**Internal**	**Test-retest**	**Correlation with other scales**			**Prediction of quit attempt**	**Prediction of abstinence**
		(Cronbach's alpha)	**(Intraclass correlation coefficient)**	**Self-efficacy (Pearson r)**	**Addiction rating (Pearson r)**	**Intent to quit (Point biserial)**	**T statistic**	**T statistic**
Total Risks	4.8 - 4.8	.88 - .93	.67 - .75	**−.35** to **−.47**	**.31** to **.40**	**−.28** to **−.19**	−1.7	−1.6
Weight gain	4.8 - 5.1	.86 - .90	.74 - .75	−.09 to **−.22**	.08 to **.27**	−.04 to **−.22**	−0.2	−0.3
Negative affect	5.1 - 5.2	.75 - .88	.53 - .65	**−.31** to **−.44**	**.28** to **.38**	−.11 to **−.27**	−1.1	−1.8
Attention	4.1 - 4.2	.96 - .98	.52 - .67	−.16 to **−.35**	.12 to **.26**	**−.32** to 0	−1.8	−0.5
Negative social	3.1 - 3.3	.56 - .64	.51 - .62	**−.20** to **−.32**	.13 to **.22**	−.14 to −.05	0.9	−0.3
Loss of enjoyment	5.1 - 5.3	.70 - .89	.54 - .65	**−.21** to **−.34**	**.25** to **.34**	**−.20** to −.09	**−2.2**	**−2.2**
Craving	6.1 - 6.2	.91 - .96	.42 - .62	**−.41** to **−.55**	**.43** to **.59**	**−.22** to −.14	−1.6	−1.9
Total Benefits	6.2 - 6.3	.93 - .96	.78 - .80	−.14 to .03	.03 to **.23**	−.08 to .07	0.5	−0.6
Long-term health	6.2 - 6.2	.85 - .93	.61 - .68	**−.27** to .02	−.02 to .18	−.12 to .04	−0.4	−0.6
Wellbeing	6.0 - 6.2	.88 - .92	.65 - .71	−.11 to −.01	.02 to **.20**	−.07 to .06	−0.4	−1.1
Self esteem	6.3 - 6.4	.91 - .93	.71 - .79	−.09 to .11	−.08 to **.22**	−.01 to .04	0.9	−0.01
Finances	6.3 - 6.5	.63 - .69	.48 - .64	−.09 to −.02	−.07 to **.22**	−.11 to .09	0.2	−1.4
More physical appeal	6.5 - 6.7	.84 - .96	.54 - .79	−.14 to .08	.03 to **.40**	−.06 to .08	0.8	−0.4
Positive social	6.2 - 6.3	.79 - .84	.62 - .78	−.11 to .02	.03 to **.26**	0 to **.17**	1.1	−0.3
Benefits minus Risks[d]	1.4 – 1.5	N/A	.66 - .74	**.21 to .43**	**−.18 to −.31**	.12 to .28	1.8	0.9

[b]Bold values, $p < .05$

[a]PRBQ = Perceived Risks and Benefits of Quitting

[c]All rated 1-7

[d]Positive values = Mean Benefits Score > Mean Risks Score