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Do risk-minimizing beliefs about smoking inhibit quitting? Findings from the International Tobacco Control (ITC) Four-Country Survey

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Abstract

Objective—To replicate findings that risk-minimizing and self-exempting beliefs lower quit intentions, and to extend this by testing their capacity to prospectively predict smoking cessation.

Method—13,324 adult (≥ 18 years) cigarette smokers from the USA, Canada, UK, and Australia from one of the first three waves (2002-2004) of the International Tobacco Control 4-Country survey were employed for the predictive analysis where beliefs measured in one wave (1-3) of a cohort were used to predict cessation outcomes in the next wave (2-4).

Results—Both types of belief were negatively associated with both intention to quit in the same wave and making a quit attempt at the next wave. When taken together and controlling for demographic factors, the risk-minimizing beliefs continued to be predictive, but the self-exempting belief was not. Some of the effects of risk-minimizing beliefs on quit attempts seem to be independent of intentions, but not consistently independent of other known predictors. There were no consistent predictive effects on sustained cessation among those who made attempts to quit for either measure.

Conclusions—Countering risk-minimizing beliefs may facilitate increased quitting, but this may not be so important for self-exempting beliefs.

Keywords

Self-exempting beliefs; risk-minimizing; intention to quit; quit attempts; prospective prediction; smoking cessation

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Precis: Evidence from 13,324 adult smokers from four countries suggests that countering risk-minimizing beliefs may facilitate quitting but this may not be necessary for beliefs in personal relative immunity to harm.

Introduction

In western countries most smokers accept that smoking is harmful and regret ever having started (Fong et al. 2004). However, many also profess beliefs that minimize or discount the harms (Chapman et al. 1993, Oakes et al. 2004), sometimes called self-exempting beliefs, but perhaps better thought of as rationalizations. Oakes et al. (2004) identified four classes of such beliefs. 'Bulletproof' beliefs, the archetypal self-exemptions in that the problem does not apply to me (e.g., "I think I must have the sort of good health or genes that means I can smoke without getting any of the harms"); and three types of risk-minimizing beliefs, that is, beliefs that the harms are not as great as some think, either absolutely or relatively: 'Skeptic' beliefs which discount the harms of smoking (e.g., "The medical evidence that smoking is harmful is exaggerated"); 'Jungle' or normalizing beliefs (e.g., "Smoking is no more risky than lots of other things people do"); and 'Worth-it' beliefs (e.g., "You've got to die of something, so why not enjoy yourself and smoke"). All four beliefs were inversely related to intentions to quit (Oakes et al. 2004), with the Worth-it beliefs having the strongest relation. Similar beliefs have also been associated with reduced interest in quitting (Peretti-Watel et al, 2007).

Rationalizing beliefs are theorized as psychological mechanisms to reduce perceptions of vulnerability or susceptibility to harm, which is postulated as a key motivator of behaviour change in theories like the Health Beliefs Model (Rosenstock, 1974; Abraham & Sheeran, 2005) and Protection Motivation Theory (Rogers, 1983; Norman, Boer & Seydal, 2005), and as such help create an optimistic bias that reduces the psychological need to act, that is, reduce cognitive dissonance (Weinstein, 1988). The other type of beliefs that theoretically should reduce the likelihood of quitting are functional beliefs in the value of smoking (Yong and Borland, 2008). However, unlike these experience-based beliefs, rationalizing beliefs do not have a tangible reality to ground them, and thus may be less stable. Oakes et al. (2004) questioned whether rationalizing beliefs are primary inhibitors of quitting or merely convenient defenses that are discarded when the cognitive dissonance is resolved by quitting (DiClemente et al. 1991, Carter et al. 2001). Collectively expectancies beliefs should affect the likelihood of quitting either independently or in interaction. This is clearly so for making quit attempts, but less so for predicting success among those who try (Borland et al, 1991; Hyland et al, 2006; Segan et al, 2002; West et al, 2001).

This paper uses data from the International Tobacco Control Policy Evaluation Project (ITC) Four-Country survey to explore the power of these beliefs to predict quitting activity prospectively. We report three replications of the findings.

The aims are:

- **a.** To explore socio-demographic correlates of those who hold these beliefs and how they relate to intentions to quit.
- **b.** To test the predictive strength of these beliefs on quitting, controlling for psychosocial factors known to affect quitting.
- **c.** To examine the stability of the beliefs as a function of interest in quitting.

Methods

Participants

13,324 adult smokers from the first three waves (2002-2004) of the ITC cohort survey carried out in four English-speaking countries: Canada, USA, UK and Australia (9,058 recruited in Wave 1; 1,714 at Wave 2; and 2,552 at Wave 3). Cooperation rates were high for a survey of

this kind (78%). Retention from waves 1 to 2 was 6,764 of 9,058 (74.7%); from waves 2 to 3 it was 5,827 of 8,478 (68.7%); and from waves 3 to 4 it was 5,979 of 8,379 (71.4%).

The ITC project is a longitudinal study designed to evaluate tobacco control policies. The average intervals between the first three wave transitions were 7, 14, and 15 months respectively. The survey, which took approximately 40 minutes, was conducted in English (or French in francophone Canada) using computer-assisted telephone interview (CATI). Recruitment methods are described elsewhere (Thompson et al. 2006), but included a small payment of US$15-20. The study protocol was cleared for ethics by the Institutional Review Boards or Research Ethics Boards in each of the countries: Universities of Waterloo (Canada) and Strathclyde (UK), Roswell Park Cancer Institute (US), and Cancer Council Victoria (Australia).

Measures

One rationalizing belief (the ones quoted in the Introduction) was adapted from each of the four scales of Oakes et al. (2004) and assessed on 5-point agree-disagree scales. They were chosen because they had the highest bivariate association with quit intentions, or in one case, because of simpler wording (Skeptic item).

Intention to quit was assessed by: “Are you planning to quit smoking within the next month, next 6 months, sometime in the future (beyond 6 months), or not planning to quit?”

Quit attempts were those reported since the previous (predictor) survey wave. Among those who made an attempt, prolonged abstinence was defined as being quit for a month or more; those who relapsed as failures, and those quit for less than a month as missing.

Demographic variables included: age, sex, minority status, educational attainment, and income levels. Income and education were classified into within country tertiles. Minority status was defined as non-white (US, Canada, UK) or spoke a language other than English in the home (Australia).

Known predictors of quit attempts and/or success (Hyland et al. 2006) were: smoking frequency (daily versus non-daily), Heaviness of smoking index (HSI) scored from 0-6 (highly addicted); recency of last quit attempt (tried within last year versus all others); length of last quit attempt (never tried, 1 week or less, > 1 week but < 6 months, 6 months or more); perceived value of quitting (“How much would you benefit from health and other gains if you were to quit smoking permanently in the next 6 months:”); value of smoking (Yong and Borland, 2008): (“You enjoy smoking too much to give it up:”); overall attitude (“What is your overall opinion of smoking?”); self-efficacy: (“If you decided to give up smoking completely in the next 6 months, how sure are you that you would succeed?”); and perceived health concerns (two questions: “How worried are you, if at all, that smoking will lower your quality of life in the future?” and “How worried are you, if at all, that smoking will damage your health in the future?”).

Statistical Analysis

SPSS 14.0 was used. Percentages reported in tables for country-specific estimates of the levels of variables were based on data weighted for age and gender for each country, unless otherwise indicated. However, all analyses were conducted on unweighted data. We tested for the independent effects of the rationalizing beliefs on both making quit attempts and the success of attempts among those who tried, both as ascertained at the next wave using sequential logistic regression; first controlling for socio-demographic effects, then (only for making quit attempts) adding intentions to quit, and finally controlling for other variables identified as important by Hyland et al. (2006). The analyses were first conducted using wave 1 beliefs to predict wave 2 outcomes, then repeated on W2-W3, and W3-W4.

Results

The three risk-minimizing beliefs were moderately inter-correlated and formed a reliable scale (alpha = 0.65, 0.63, 0.66 for the three replications). The results we report are on the scale rather than treating the beliefs individually because in preliminary work the results were stronger and more consistent when combined, consistent with them measuring a common underlying factor (see Table 1). The self-exempting belief predicted quite differently so was kept separate, although it was moderately correlated with the risk-minimizing beliefs.

We found considerable stability of the beliefs for both W1-W2 and W2-W3 transitions (risk-minimizing beliefs correlated 0.63 for both, and self-exempts 0.49 and 0.50, respectively). The level of beliefs reduced (on average up to 0.5 on the 5 point scale) with increasing interest in quitting (or actually quitting), but even for the most extreme case (from no interest to actually quit), wave-to-wave correlations were still quite large (around 0.3 or greater).

Older smokers, in particular, were more likely to endorse both types of belief as were the most disadvantaged (see Table 2 for wave 1 data). Rationalizing beliefs were overall stronger in the UK compared to the other three countries. Further, as predicted, both types of belief were associated with reduced interest in quitting (see Table 1). We also tested the belief-intention relation with the three risk-minimizing beliefs separately and found all three negatively related to quit intentions in all waves (range 0.20 to 0.36, all Ps <.001). Based on this and other results, not reported here, we concluded that the three items were most economically treated as a scale.

We next examined relations between each type of belief among smokers at one Wave and quitting activity at the next. Both self-exempting and risk-minimizing beliefs were negatively associated with subsequent quitting attempts (see Table 1).

Prospective, multiple logistic regression analyses were undertaken to see if the effects on quitting activity for the two beliefs were independent of each other controlling for demographic variables, wave of entry to the study (from Wave 2), and interaction effects between country and the beliefs, and found none (not reported in the Table). In all three replications, the 3-item risk-minimizing belief scale was an independent predictor of quit attempts (see Table 3, Direct effects). It remained significant when intention to quit was added. However, when other known predictors (Hyland et al. 2006) were added it only remained significant in one of the three replications (W2-W3). The self-exempting belief was not related to quit attempts, except in the W1-W2 replication where, when all independent predictors of quitting were added, it was positively associated with quit attempts (i.e., opposite to its bivariate association). In the other two replications there was no evidence of this effect.

Next, we tested for possible moderating effects of smoking-related psychosocial variables by including the interaction term between the risk-minimizing beliefs and separately, perceived benefits of quitting, health concerns due to smoking, and overall attitudes to smoking. We found no significant interactions.

We next examined whether the beliefs were associated with success among those who tried to quit between waves. In two of the replications neither bivariate nor multivariate relations were found (see Table 4). However, in the W2-W3 replication both the risk-minimizing beliefs and the self-exempting belief were significant independent predictor of sustained abstinence and remained significant even after adjusting for socio-demographic variables, wave-of-entry effect and known predictors of quitting. As expected, those with high risk-minimizing beliefs were less likely to stay quit. Unexpectedly (but consistent with the isolated effect on attempts to quit), those with a high self-exempting belief were more likely to stay quit, a finding we discuss later.

Finally, to see if these beliefs were related to longer-term relapse, we examined the association between the beliefs reported at Wave 2 among those quit at that wave and quit status at Wave 3 (*n*=419). This was not done using Wave 1 data because we only recruited smokers. No significant associations were found for both bivariate and multivariate analyses controlling for socio-demographics (Risk-minimizing OR=1.08, 95%CI: 0.80-1.45, p=.62; Self-exempting OR=0.73, 95%CI: 0.81-1.35, p=.73). When replicated with W3-W4 data (n=610) we again found no significant bivariate association with either type of belief; however, risk-minimizing beliefs became marginally significant after controlling for socio-demographics, with those endorsing such beliefs being more likely to relapse (OR=1.33, 95%CI: 1.01-1.74, p=.04).

Discussion

The results confirm earlier work that rationalizing beliefs are related to intentions to quit, and that these beliefs are most strongly held among older smokers and those from more disadvantaged backgrounds (Oakes et al. 2004; Peretti-Watel et al, 2007). This study shows that risk-minimizing beliefs independently predict quit attempts, with those holding the beliefs being less likely to make quit attempts. However, the self-exempting belief (Oakes et al.'s Bulletproof belief) operates in a different way, once the shared variance with the risk-minimizing beliefs is accounted for. Those who believe they are genetically protected from smoking-related disease were not less likely to make quit attempts, and in one of the three replications (W1-W2) were actually more likely to do so. Given that there was no evidence for this in the other two replications, we conclude that this belief is not independently related to quit attempts.

Neither type of belief consistently predicted quit success. At Wave 2 the self-exempting belief was positively associated with subsequent quit success, however this was not replicated. These findings are strong evidence that the self-exempting belief does not inhibit successful quitting as has been postulated, at least when controlling for the effects of risk-minimizing beliefs and other factors. However, it needs to be replicated with other measures before we can conclude that the effect is general. However, it is reassuring in the context of increased interest in genetic markers of risk (e.g., Wright et al. 2007), because it shows that at least one form of belief about reduced genetic susceptibility does not lead to less quitting. Nevertheless, care should be taken in generalizing to effects that might be found if scientific evidence of possible reduced risk was communicated to people at lower genetic risk, rather than the more speculative (uninformed by evidence) belief we have studied here. Further, as the framing of risk perception questions affects responses (Abraham & Sheeran, 2005), care should be taken in generalizing to other risk-related or susceptibility beliefs.

The use of a three-item risk-minimizing beliefs scale gave equivalent, but more stable findings than the use of the items separately. This suggests that they tap the same underlying construct. There was a consistent predictive effect of the scale on quit attempts, but only in one wave was this independent of other known predictors, suggesting much of the effect may be mediated by other determinants of quitting. The data is inconsistent with regard to any effects on sustained cessation, with the bulk of the evidence suggesting no clear effect, when the beliefs were measured pre-quitting. Post-quitting risk-minimizing beliefs were significant predictors in one of two replications, so more research is needed on potential effects on relapse.

We have no good explanation for the differences in prediction across waves. We explored possible time-in-sample effects, but found none. We can think of no differences in the common environments across the four countries that could explain the effects either, and don't see the varying inter-survey intervals as a plausible explanation.

The results supported the stable belief hypothesis over the convenient defense hypothesis of Oakes et al. (2004). The risk-minimizing beliefs were relatively stable and do inhibit cessation. However, these beliefs do not appear to operate independently of other expectancy beliefs, with how they interrelate needing to be better understood. Encouraging smokers to make quit attempts should include strategies to challenge all relevant inhibiting beliefs. Logically, challenging risk-minimizing beliefs could be done by increasing perceptions of health gains from quitting and by decreasing perceived values of smoking (Velicer et al. 1985, Prochaska et al. 1994). However, we suspect more will be required as beliefs are not simply additive in their relationship to intentions, suggesting an element of influence that might be more emotionally than logically grounded.

The demographic effects require mention. Risk-minimizing beliefs were held more strongly by lower SES smokers, and may mediate lower interest in quitting. The increased prevalence may be a combination of the disadvantaged having fewer alternative sources of enjoyment in their lives, and living in a more pro-tobacco culture (greater smoking prevalence) than affluent communities. Helping low income smokers understand the transient and unsatisfactory rewards of smoking might be important in helping them believe that quitting is going to be worth the effort, and may also contribute to facilitating these communities becoming less smoking friendly.

In conclusion, risk-minimizing beliefs seem to reduce quitting activity both directly and indirectly via their effect on intentions to change. Interventions may be needed to target these beliefs directly, but we suspect that this will work best if the interventions are sensitive to the emotional rather than rational basis of the association and are accompanied by assistance to increase capacity to change. Because these beliefs are higher among disadvantaged smokers, one focus of future work should be on challenging these beliefs in this group. By contrast, we found no independent effect for the self-exempting belief, suggesting that it may be less important as a justification for avoidance of quitting.

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Table 1

Range of correlations between rationalizing beliefs and other key determinants of quitting – Range across 3 waves of surveys (conducted 2002-2005 in Australia, Canada, UK and USA).

	Skeptic	Worth it	Normalizing	Total Risk–Minimizing	Self-Exempting
Skeptic	-	.35 - .37	.35 – .36	.73	.34 - .37
Worth it	.35 - .37	-	.45 – .48	.80 – .81	.31 – .34
Normalizing	.34 - .36	.45 - .48	-	.78 – .80	.25 - .29
Total Risk-Minimizing	.73	.80 – .81	.78 – .80	-	.39 - .43
Self-Exempting	34 - .37	.31 - .34	.25 – .29	.39 – .43	-
Functional beliefs	.14 - .18	.31 – .34	.14 – .19	.26 - .30	.17 - .18
Outcome Expectancy	-(.29 - .31)	-(.30 – .32)	-(.25 – .27)	-(.36 – .38)	-(.27 – .30)
Health Concerns	-(.31 - .35)	-(.38 - .42)	-(.33 - .38)	-(.44 - .49)	-(.29 - .32)
Overall Attitudes	.26 - .27	.32	.29 - .30	.38	.20 - .22
Self – Efficacy	n.s.	-(.09 - .10)	n.s.	-(.06)	n.s.
HSI*	.10 - .11	.15 - .16	.05 - .07	.13 - .14	.05
Intention	-(.20 - .23)	-(.32 - .36)	-(.23 - .26)	-(.33 - .37)	-(.18 - .21)
Quit attempts	-(.10 - .13)	-(.18 - .19)	-(.11 - .14)	-(.17 - .20)	-(.07 - .09)
Quit success	n.s	n.s.	n.s	n.s	n.s

NB. Where there is a single number all three were the same to 2 decimal places.

The bracket ones were for negative correlations

All reported correlations are significant at $p<0.001$

* HSI- Heaviness of Smoking Index

n.s. = not significant

Table 2

Rationalizing beliefs of adult current smokers at recruitment wave by socio-demographics (sample collected 2002-2004 from countries noted below).

Variables	Rationalizing Beliefs	
	Self-Exempting M (SD)	**Risk-Minimizing M (SD)**
Age 18-24 yrs	2.1 (1.0)	2.7 (0.8)
25-39 yrs	2.1 (1.0)	2.7 (0.9)
40-54 yrs	2.4 (1.1)	2.7 (0.9)
55+ yrs	2.9 (1.1)	3.1 (0.9)
Sex Male	2.4 (1.1)	2.8 (0.9)
Female	2.3 (1.0)	2.8 (0.9)
Education levels[*] [†]		
Low	2.4 (1.1)	2.9 (0.9)
Moderate	2.3 (1.1)	2.7 (0.9)
High	2.2 (1.1)	2.6 (0.9)
Income levels[*] [†]		
Low	2.5 (1.1)	2.9 (0.9)
Moderate	2.3 (1.1)	2.8 (0.9)
High	2.3 (1.0)	2.7 (0.9)
Refused	2.6 (1.1)	3.0 (0.9)
Minority status[*]		
Identified minority	2.4 (1.1)	2.8 (0.9)
Other	2.3 (1.1)	2.8 (0.9)
Country[*]		
Canada	2.3 (1.1)	2.7 (0.9)
US	2.3 (1.1)	2.8 (0.9)
UK	2.5 (1.0)	2.9 (0.8)
Australia	2.3 (1.1)	2.8 (0.9)

[*] Weighted to the age by sex distribution of smokers in the respective country;

[†] Education and income use measures are not directly comparable across countries;

M, mean; SD, standard deviation; Beliefs assessed on 5 point scales

All associations in the table above were significant at $p<.001$ except for minority status where the association was significant at $p<.01$ for self-exempting beliefs and not significant for risk-minimizing beliefs.

Table 3

Logistic regression analysis: Independent predictors of subsequent quit attempts (reported at the next wave) - (study conducted 2002-2005 in Australia, Canada, UK and USA).

Predictors	Quit Attempts (reported at the next wave) OR (95% CI)		
Model	**Direct effects[c,f]**	**Via intention [d]**	**Independent effects [e]**
Wave 1: (36.6% of 6187 made attempts)			
Self-exempting	1.01 (0.96-1.07)	1.05 (0.99-1.11)	1.09 (1.03-1.16)[a]
Risk-minimizing	0.67 (0.62-0.71)[b]	0.85 (0.79-0.91)[b]	0.98 (0.91-1.06)
Nagelkerke R square	.066	.219	.254
Wave 2: (40.5% of 4615 made attempts)			
Self-exempting	0.95 (0.89-1.01)	0.98 (0.91-1.05)	1.00 (0.93-1.07)
Risk-minimizing	0.65 (0.61-0.70)[b]	0.80 (0.74-0.87)[b]	0.87 (0.80-0.96)[a]
Nagelkerke R square	.068	.173	.250
Wave 3: (40.1% of 4648 made attempts)			
Self-exempting	0.95 (0.89-1.02)	0.96 (0.90-1.04)	0.98 (0.91-1.06)
Risk-minimizing	0.64 (0.59-0.69)[b]	0.80 (0.74-0.88)[b]	0.91 (0.83-1.00)
Nagelkerke R square	.065	.166	.241

[a] significant at $p < .01$;

[b] $p < .001$;

[c] OR adjusted for socio-demographics (age, sex, education, income, minority status, country);

[d] OR also adjusted for intention to quit;

[e] OR also adjusted for a set of core predictors of quitting as reported in Hyland et al. (2006);

[f] OR also adjusted for survey sampling effect for replication model using Waves 2-4 data.

Table 4

Logistic regression analysis: Independent predictors of subsequent quit success (reported at the next wave) - (study conducted 2002-2005 in Australia, Canada, UK and USA).

Predictors	Quit Success (reported at the next wave) OR (95% CI)	
Model	Predictive [c,e]	Independent effect [d]
Wave 1: (20.0% of 2130 were quit for >= 1 month)		
Self-exempting	0.93 (0.83-1.04)	0.89 (0.80-1.01)
Risk-minimizing	1.03 (0.90-1.18)	0.79 (0.87-1.19)
Nagelkerke R square	.027	.116
Wave 2: (22.6% of 1763 were quit for >= 1 month)		
Self-exempting	1.25 (1.10-1.41)[b]	1.24 (1.09-1.41)[b]
Risk-minimizing	0.82 (0.71-0.96)[a]	0.78 (0.65-0.92)[b]
Nagelkerke R square	.059	.122
Wave 3: (25.6% of 1795 were quit for >= 1 month)		
Self-exempting	1.04 (0.92-1.18)	0.99 (0.87-1.13)
Risk-minimizing	1.03 (0.89-1.18)	1.02 (0.87-1.20)
Nagelkerke R square	.024	.085

[a] significant at $p < .05$;

[b] $p < .01$;

[c] OR adjusted for socio-demographics (age, sex, education, income, country;

[d] OR adjusted for a set of core predictors of quitting as reported in Hyland et al. (2006);

[e] OR also adjusted for survey sampling effect for replication model using Waves 2-4 data.