

3.2 General mediators and moderators of tobacco use behaviours

Introduction

Presented in this section are a core set of general mediator and moderator variables that should be considered when evaluating tobacco control programmes and policies. A brief description and assessment of several standard measures for assessing these constructs are provided as well. Mediators are variables situated on the causal pathway between a policy and its public health impact (i.e. variables that are affected by policies and that in turn, influence health or behavioural outcomes). For instance, motivation to quit may increase after an anti-tobacco information campaign, and motivation in turn predicts whether smokers will quit. Moderators are factors not directly affected by the specific policy under scrutiny, but that moderate the effect of that policy. For example, an information campaign may be effective among one age group while being ineffective in another (Figure 3.2). Analyzing mediators sheds light on how policies and interventions have an impact; analyzing moderators aids in understanding under what conditions and in which groups they work, or do not work. In the context of policy evaluation, nothing is as

practical as a good theory that explains what to measure, how to interpret the results, what course of action to take based on these results, and what consequences can be expected from these actions. To establish a list of these mediators and moderators, the Working Group (WG) drew on relevant behaviour theories (Conner & Norman, 1996) including the Social Cognitive Theory (Bandura, 1986), the Health Belief Model (Janz & Becker, 1984), the Trans-theoretical Model of Change (Prochaska *et al.*, 1992), the Protection Motivation Theory (Rogers, 1975), the Theory of Planned Behavior (Ajzen, 1991), and the Prime Theory (West & Hardy, 2006). In particular, readers are referred to the theoretical framework of the International Tobacco Control Policy Evaluation Survey (ITC), which was developed specifically for the evaluation of the WHO Framework Convention on Tobacco Control (FCTC), and within which surveys can be developed and interpreted (Fong *et al.*, 2006a; Thompson *et al.*, 2006). A comprehensive list of all the psychosocial determinants of smoking behaviour would result in a long questionnaire in the context of policy evaluation. Therefore, the

WG established a short list of the variables considered to be the most relevant and useful for the evaluation of tobacco control policies and interventions in general. Researchers can complement this list by adding other relevant measures, depending on the aim and cultural context of each study, and the specific interventions under evaluation.

Guiding principles in the establishment of this list were the usefulness of each measure, its influence in the published literature, and the availability of associated validation studies (which were not always available). Some measures for which no psychometric tests of validity were available were nevertheless included because of their face validity and lack of alternative validated measures. Efficiency was also an important criterion of selection: the WG chose instruments that were both brief and informative, excluding long instruments, even if they were widely used. When several comparable scales were available, the most influential one was chosen, based on the number of citations to the original articles describing these scales (Bakkalbasi *et al.*, 2006).

The psychological determinants of tobacco use and cessation range

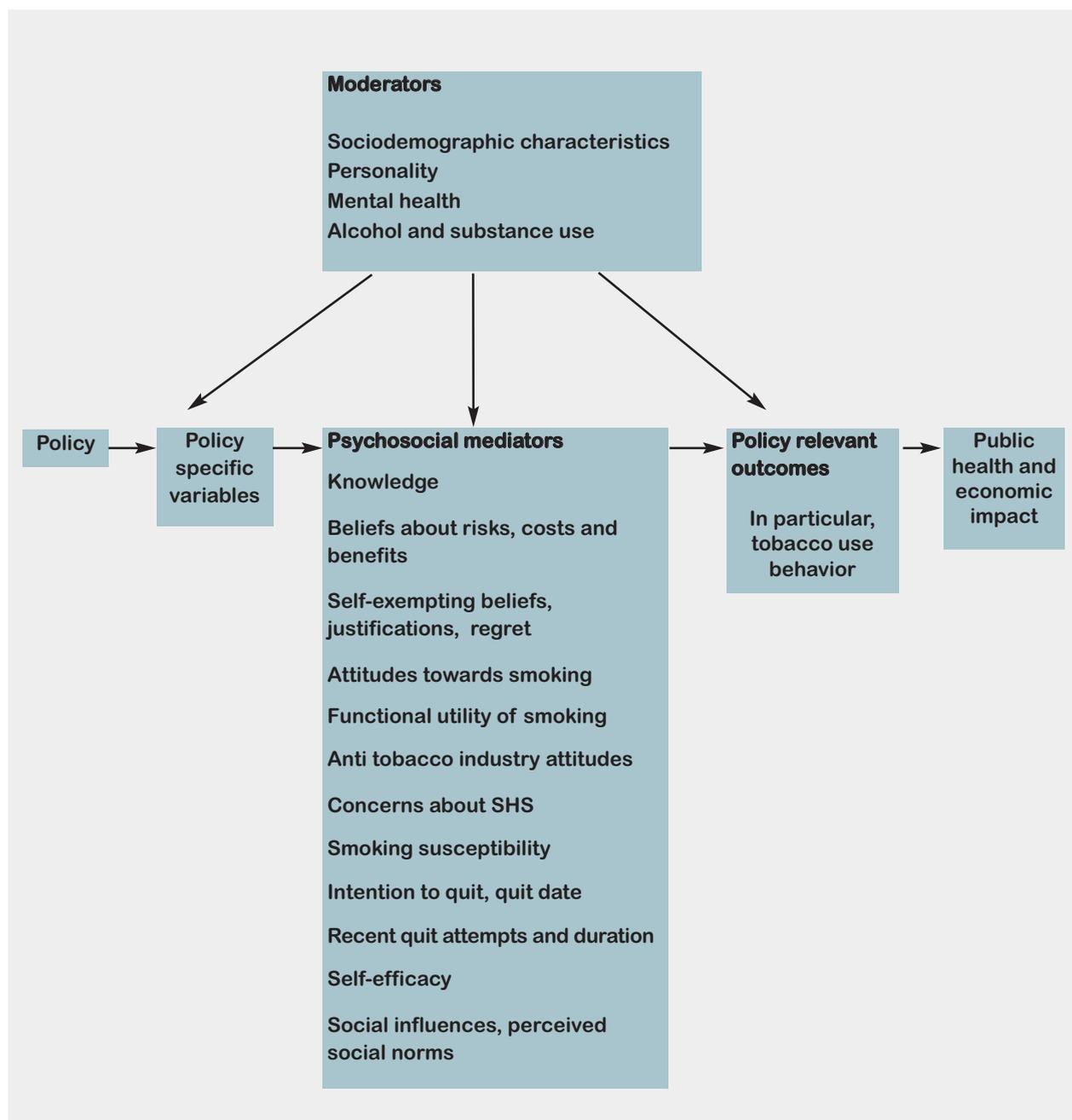


Figure 3.2 The role of psychosocial variables in the causal chain between policy and public health impact

from cognitive, motivational, and emotional variables to personality traits, personal life events, and psychopathology variables. It is important to note that many quit attempts are not planned (Larabie, 2005), that the triggers of relapse are often quite contextual, and that the timely response of the subject in each specific situation is determinant (West & Hardy, 2006). Thus, ideally, measurements should be both timely and contextual, which is not always feasible. Therefore, the WG excluded the assessment of temporary states of mind (e.g. the euphoria caused by an alcoholic drink) that are good proximal predictors of relapse, because their assessment requires specific techniques (ecological momentary assessments) that are not easily implemented in the context of policy evaluation (Shiffman *et al.*, 2002).

Smoking prevalence is much higher in psychiatric patients than in the general population, and on average, smokers with psychiatric disorders are more dependent on tobacco than other smokers (Breslau, 1995). There is also a concern that, in countries where smoking prevalence declines, an increasing proportion of the remaining smokers have psychiatric disorders (Lasser *et al.*, 2000). Thus, an assessment of mental health is relevant to the study of smoking behaviour. In addition, it is suggested that alcohol use and abuse be assessed, as both are strongly associated with tobacco use.

Depending on the context, evaluators can also assess illicit drug use, for instance by using the WHO ASSIST questionnaire (WHO ASSIST Working Group, 2002; Newcombe *et al.*, 2005).

The set of general mediators and moderators considered in this section was derived from theory, published research, and the WG's subjective assessment of what is relevant for policy evaluation. This list (Table 3.20), though not comprehensive, is believed to represent a core set of measures useful in explaining how policies and interventions work, in which population subgroups they work, and how to improve them.

Items and scales used to assess the psychological determinants of smoking

Mediators

Cognitive variables

Perceived risk and outcome expectancies

For many quitters, smoking cessation is preceded by a change in beliefs about the costs and benefits of smoking and of quitting (Etter *et al.*, 2000a). These beliefs are often the target of prevention interventions, and it is therefore important to include them in programme evaluations. Assessing personalized beliefs that the respondent has about himself or herself is suggested, rather than general awareness, since personalized beliefs are stronger

predictors of behaviour. Three questions are proposed to assess a respondent's perceived risk of disease: "How would you compare your chance of getting lung cancer compared to the chance of a nonsmoker?" "Do you worry that smoking will damage your health?" "How much do you think you would benefit from quitting smoking?" (Table 3.21). Additional specific beliefs are covered in other sections of this Handbook.

Validity. For the question on "worrying that smoking will damage the smoker's health," the test-retest intraclass correlation, assessed eight months apart in daily smokers with no quit attempts, was $r=0.59$ (Yan, 2007). In an analysis of daily smokers in the ITC surveys, this question predicted whether participants made a quit attempt (very worried versus not at all worried, odds ratio (OR) = 3.24 for quit attempts, 95% confidence interval (CI): 2.67-3.94) (Thompson *et al.*, 2006; Yan, 2007). For the question on "the benefits of quitting smoking," the test-retest intraclass correlation was $r=0.54$, for assessments made eight months apart in daily smokers with no quit attempts (Yan, 2007). In an analysis of daily smokers in the ITC surveys, the question on "the benefits of quitting" predicted smoking cessation after eight months (extremely versus not at all, OR = 2.11, 95% CI: 1.23-3.60) (Yan, 2007). These questions therefore have some evidence of validity.

I. Mediators

a. Cognitive variables:

- Knowledge
- Beliefs about the risks, costs, and benefits of smoking and of quitting
- Self-exempting beliefs, justifications, regret
- Attitudes towards smoking, functional utility of smoking
- Anti-tobacco industry attitudes
- Concerns about exposing others to secondhand smoke

b. Motivational variables:

- Smoking susceptibility (adolescents)
- Intention to quit and quit date
- Recent quit attempts and duration of the last quit attempt

c. Self-efficacy

d. Social influences, perceived social norms

II. Moderators

a. Sociodemographic characteristics:

- Age
- Sex
- Socioeconomic status (education, income, occupation)
- Ethnicity, primary language, minority group status
- Religion
- Family structure, peer and family smoking
- Country of residence and language of the interview (recorded by the interviewer)

b. Personality

c. Mental health:

- WHO-5 Well-Being Index
- 2-item screening for current symptoms of depression

d. Alcohol use and abuse:

- Alcohol Use Disorders Identification Test (AUDIT-C)

Table 3.20 List of Some Relevant Psychosocial Determinants of Smoking

Construct	Question and Link	Responses, Scoring	Adult / Adolescent	Recommended / Optional	Validity Level	References
	Mediators <i>Cognitive variables</i>					
Perceived risk	Let's say that you continue to smoke the amount you do now. How would you compare your own chance of getting lung cancer in the future to the chance of a nonsmoker?	. Much more likely to get lung cancer than a nonsmoker? . Somewhat more likely . A little more likely . Just as likely	All smokers	Recommended	Face valid	ITC ^W 2-175
Perceived risk	How worried are you if at all, that smoking will damage your health in the future?	. Not at all worried . A little worried . Moderately worried . Very worried	All smokers	Recommended	Validated	ITC ^W 2-180
Self-exempting beliefs	The medical evidence that smoking is harmful is exaggerated.	. Strongly agree . Agree . Neither agree nor disagree . Disagree . Strongly disagree	All	Optional	Validated	ITC ^W 2-163
Self-exempting beliefs	You have the kind of genetic make-up that allows you to smoke without it giving you health problems.	. Strongly agree . Agree . Neither agree nor disagree . Disagree . Strongly disagree	All	Optional	Face valid	ITC ^W 2-99
Regret	If you had to do it over again, you would start smoking again	. Strongly agree . Agree . Neither agree nor disagree . Disagree . Strongly disagree	Current and former smokers	Recommended	Face valid	ITC ^W 2-98
Attitudes Towards smoking Scale (ATS ¹⁸ scale)	The following are some statements concerning smoking. Please indicate whether or not you agree with each of them. 1. Smoking is extremely dangerous to my health 2. I spend too much money on cigarettes 3. My cigarette smoke bothers other people a great deal. 4. A cigarette calms me down when I am stressed. 5. After a cigarette I am able to concentrate better. 6. I love smoking	. Strongly agree . Agree . Neither agree nor disagree . Disagree . Strongly disagree	All smokers	Optional	Validated	Etter & Piermeger (1999) Etter <i>et al</i> (2000a) Christie & Etter (2005)

Table 3.21 Measures of the Psychosocial Determinants of Smoking

Construct	Question and Link	Responses, Scoring	Adult / Adolescent	Recommended / Optional	Validity Level	References
	Mediators <i>Cognitive variables</i>					
Benefits of quitting	How much do you think you would benefit from health and other gains if you were to quit smoking permanently in the next 6 months?	<ul style="list-style-type: none"> . Not at all . Slightly . Moderately . Very much . Extremely 	All smokers	Optional	Validated	ITC-W2-133
Functional utility	Smoking helps you to control your weight	<ul style="list-style-type: none"> . Strongly agree . Agree . Neither agree nor disagree . Disagree . Strongly disagree 	All	Recommended	Validated	ITC-W2-156
Functional utility	Smoking calms you down when you are stressed or upset	<ul style="list-style-type: none"> . Strongly agree . Agree . Neither agree nor disagree . Disagree . Strongly disagree 	All	Optional	Validated	ITC-W2-152 Etter <i>et al</i> (2000a)
Anti-industry attitudes	Tobacco companies can be trusted to tell the truth about the dangers of their products	<ul style="list-style-type: none"> . Strongly agree . Agree . Neither agree nor disagree . Disagree . Strongly disagree 	All	Recommended	Validated	ITC-W2-169
Anti-industry attitudes	Tobacco companies have tried to convince the public that there is little or no health risk from secondhand smoke.	<ul style="list-style-type: none"> . Strongly agree . Agree . Neither agree nor disagree . Disagree . Strongly disagree 	All	Recommended	Validated	ITC-W2-172
Concerns SHS	Your cigarette smoke is dangerous to those around you.	<ul style="list-style-type: none"> . Strongly agree . Agree . Neither agree nor disagree . Disagree . Strongly disagree 	All smokers	Recommended	Validated	ITC-W2-150
Concerns SHS	In the last month, how often, if at all, did you think about the harm your smoking might be doing to other people?	<ul style="list-style-type: none"> . Never . Rarely . Sometimes . Often . Very often 	All smokers	Optional	Validated	ITC-W2-45d

Table 3.21 Measures of the Psychosocial Determinants of Smoking

Construct	Question and Link	Responses, Scoring	Adult / Adolescent	Recommended / Optional	Validity Level	References
	Mediators					
	<i>Motivational variables</i>					
Smoking susceptibility	Pierce's Smoking Susceptibility Scale (3 items) 1. (<i>Intention</i>) Do you think you will try a cigarette soon? 2. (<i>Efficacy</i>) If one of your best friends were to offer you a cigarette would you smoke it? 3. (<i>Intention</i>) Do you think you will be smoking cigarettes 1 year from now? http://dcpops.nci.nih.gov/TCRB/susceptibility.html	Are you seriously thinking of quitting smoking?	Adolescent	Recommended	Validated	Pierce <i>et al.</i> (1996)
Intention to quit	Are you seriously thinking of quitting smoking?	1: Yes, No, 2+3: • Definitely yes • Probably yes • Probably not • Definitely not • No • yes, but I have not decided when • Yes, I plan to quit within the next 30 days	All smokers	Recommended	Utility	Prochaska <i>et al.</i> (1992)
Quit date	Have you set a firm date to quit smoking? If answer = Yes: When is this date?	Yes, No (mm/dd/yyyy) Yes, No, I don't remember	All smokers	Recommended	Face valid	ITC*W5-184
Quit attempts	In the past 12 months, did you seriously try to quit smoking?	Days, weeks, months, years	All smokers	Recommended	Face valid	Ad hoc
Duration of last quit attempt	Thinking about any quit attempt that ENDED within the last 12 months—since [12M anchor]—what is the longest time that you stayed smoke free?		All smokers	Optional	Face valid	ITC*W244
Self-efficacy, smokers	Thinking about any quit attempt that ENDED within the last 12 months—since [12M anchor]—what is the longest time that you stayed smoke free? If you decided to give up completely in the next 6 months, how sure are you that you would succeed (Responded does not need to be intending to quit to respond. Emphasize "if" in wording)	• Not at all sure • Slightly sure • Moderately sure • Very sure • Extremely sure	All smokers	Recommended	Validated	ITC*W2129
Self-efficacy nonsmokers	How confident are you that you will remain a non smoker	• Not at all sure • Slightly sure • Moderately sure • Very sure • Extremely sure	Nonsmokers	Recommended	Face valid	ITC*W2129
Social influences, smokers	There are fewer places where you feel comfortable about smoking	• Strongly agree • Agree • Neither agree nor disagree • Disagree • Strongly disagree	All smokers	Recommended	Face valid	ITC*W2159
Social influences, former smokers	There are fewer and fewer places where you would feel comfortable about smoking	• Strongly agree • Agree • Neither agree nor disagree • Disagree • Strongly disagree	Former smokers	Recommended	Face valid	ITC*W2159

Table 3.21 Measures of the Psychosocial Determinants of Smoking

Construct	Question and Link	Responses, Scoring	Adult / Adolescent	Recommended / Optional	Validity Level	References
	Mediators					
	Motivational variables					
Perceived social norms	People who are important to you believe that you should not smoke.	<ul style="list-style-type: none"> . Strongly agree . Agree . Neither agree nor disagree . Disagree . Strongly disagree 	All smokers	Recommended	Face valid	ITC-W2-158
Perceived social norms	Society disapproves of smoking.	<ul style="list-style-type: none"> . Strongly agree . Agree . Neither agree nor disagree . Disagree . Strongly disagree 	All	Recommended	Validated	ITC-W2-160
Sociodemographic characteristics	Moderators Age, sex, socioeconomic status (education, income, occupation), ethnicity, primary language, minority group, religion, family structure, peer and family smoking, country of residence, language of the interview	(National census questions)	All	Recommended	Face valid	-
Smokers at home	How many people live in your household, including yourself? How many of the [number above] people currently smoke tobacco, either daily or less than every day, including yourself?	Number: ___	All	Recommended	Face valid	ITC-recr-2-3
Peer and family smoking	Peer and Family smoking, 5-item scale (Pierce <i>et al.</i> , 1998) 1. Do any of your parents, step-parents, or guardians now smoke cigarettes? 2. Do you have any older brothers or sisters? 3. Do your older brothers or sisters smoke cigarettes? 4. Of your best friends who are male, how many of them smoke? 5. Of your best friends who are female, how many of them smoke? http://dcccps.nci.nih.gov/TCRB/plfs.html	Answers are scored dichotomously as "no exposure" versus "exposure". No family exposure: negative response to both items 1 and 3. No exposure to friend smoking: response=zero to both items 4 and 5.	Adolescent	Recommended	Utility	Pierce <i>et al.</i> (1998c)
Friends who smoke	Of the five closest friends or acquaintances that you spend time with on a regular basis, how many of them are smokers?	Number: ___	Adolescent	Recommended	Validated	ITC-W2-189

Table 3.21 Measures of the Psychosocial Determinants of Smoking

Construct	Question and Link	Responses, Scoring	Adult / Adolescent	Recommended / Optional	Validity Level	References
Mental health	Moderators WHO-5 Well-Being Index Please indicate for each of the five statements which is closest to how you have been feeling over the last two weeks. Notice that higher numbers mean better well-being. <i>Over the last two weeks:</i> 1. I have felt cheerful and in good spirits. 2. I have felt calm and relaxed 3. I have felt active and vigorous 4. I woke up feeling fresh and rested 5. My daily life has been filled with things that interest me. http://www.who-5.org/	5=All of the time 4=Most of the time 3=More than half of the time 2=Less than half of the time 1=Some of the time 0=At no time	All	Recommended	Validated	Whooley <i>et al.</i> (1997) Bonsignore <i>et al.</i> (2001) Henkel <i>et al.</i> (2003) Henkel <i>et al.</i> (2004a)
Depression screening test	2-Item screening test for current symptoms of depression: 1. During the past month, have you often been bothered by feeling down, depressed or hopeless? 2. During the past month, have you often been bothered by little interest or pleasure in doing things?	Yes, No	All	Recommended	Validated	Whooley <i>et al.</i> (1997) Kessler <i>et al.</i> (2002) Henkel <i>et al.</i> (2003) Henkel <i>et al.</i> (2004a) Henkel <i>et al.</i> (2004b)
Alcohol (AUDIT-C)	Alcohol Use Disorders Identification Test (AUDIT-C) (3 questions) http://www.oqp.med.va.gov/general/uploads/FAQ%20AUDIT-C%20for%20clinicians.doc		All	Recommended	Gold standard	Bush <i>et al.</i> (1998) Reinert & Allen (2002) Rumpf <i>et al.</i> (2002)
AUDIT-C	1. How often did you have a drink containing alcohol in the past year? Consider a "drink" to be a can or bottle of beer, a glass of wine, a wine cooler, or one cocktail or shot of hard liquor (like scotch, gin, or vodka).	Never Monthly or less 2 to 4 times a month 2 to 3 times a week 4 to 5 times a week 6 or more times a week	All	Recommended		Bush <i>et al.</i> (1998)
AUDIT-C	2. How many drinks did you have on a typical day when you were drinking in the past year?	0 drinks 1 to 2 drinks 3 to 4 drinks 5 to 6 drinks 7 to 9 drinks 10 or more drinks	All	Recommended		Bush <i>et al.</i> (1998)
AUDIT-C	3: How often did you have six or more drinks on one occasion in the past year?	Never Less than monthly Monthly Weekly Daily or almost daily	All	Recommended		Bush <i>et al.</i> (1998)

ITC W2: International Tobacco Control Policy Evaluation Survey, Wave 2, (followed by item number)
SHS: Secondhand Smoke

Table 3.21 Measures of the Psychosocial Determinants of Smoking

Self-exempting beliefs, justifications, and regret

Smokers continue to smoke, and nonsmokers start to smoke even though they are aware of the risks of smoking, in part because of self-exempting beliefs and other justifications (Chapman *et al.*, 1993; Weinstein, 1999). Quitting smoking may require shedding such beliefs and accepting information about the risks of smoking. The WG suggests including one question derived from the ITC survey, on whether people think that the medical evidence that smoking is harmful is exaggerated (Table 3.21).

Validity: In daily smokers in the ITC survey, the test-retest reliability on the question "the medical evidence... is exaggerated" was 0.64 (Yan, 2007). This question predicted smoking cessation after eight months (strongly disagree versus strongly agree, OR = 2.23, 95% CI: 1.17-4.23) (Yan, 2007). This question has some evidence of validity.

Regret

Many smokers express regret that they ever started to smoke. The WG suggests including one question on "whether the respondent would start smoking, if they had to do it over again."

Validity: In daily smokers in the ITC survey, the test-retest correlation for this question was 0.62 (Yan, 2007). Smokers who strongly disagreed with this statement were

less likely to make a quit attempt in the next eight months than those who strongly agreed (OR = 0.42, 95% CI: 0.24-0.75), but they were as likely to quit smoking (Yan, 2007). This question may nevertheless be retained because of its face validity.

Attitudes towards smoking

"Attitudes" are defined as the degree to which people have a favorable or unfavorable evaluation of smoking (Ajzen, 1991). Among the main drawbacks of smoking, as reported by smokers themselves, are the health risks, the financial costs, the bad smell, and the fact that secondhand smoke (SHS) bothers other people (Etter *et al.*, 2000a). Among the most frequently cited advantages of smoking are the pleasure to smoke, its relaxing effects, and the relief of withdrawal symptoms (Etter *et al.*, 2000a). These elements are captured by several scales, for instance the Attitudes Towards Smoking Scale (ATS-18) (Etter *et al.*, 2000a); using a few items from this scale is recommended.

Validity: The ATS-18 has a robust factor structure across various samples, and test-retest correlations were high (in the range of 0.8 to 0.9) (Etter & Perneger, 1999; Etter *et al.*, 2000a; Christie & Etter, 2005). The hypothesized association between attitudes and intention to quit has been reproduced in several studies (Etter & Perneger, 1999; Etter *et al.*, 2000a; Christie & Etter, 2005),

and a differential score (advantages minus drawbacks) prospectively predicted both smoking cessation in current smokers and relapse in former smokers, with differences between smokers and quitters ranging from 0.5 to 1.4 standard deviation units of this scale (Etter *et al.*, 2000a). This scale can therefore be considered to have adequate validity (Table 3.21).

Functional utility of smoking

Many smokers use cigarettes to control their weight or as response to stress, even though tobacco withdrawal itself is a strong stressor. Two questions from the ITC survey, "whether smoking helps smokers control their weight," and "whether smoking calms them down when they are stressed or upset," should be included.

Validity: In a prospective sample of 272 current and former smokers, the item "smoking calms me down when I am stressed or upset" had a test-retest correlation of 0.8, and the item predicted relapse in ex-smokers (difference between abstainers and relapsers, 2.3 standard deviation units, $p < 0.001$) (Etter *et al.*, 2000a). This item can therefore be considered to have adequate validity.

For the question on "whether smoking helps smokers control their weight," the test-retest reliability (eight months apart) in smokers in the ITC survey was $r = 0.74$ (Yan, 2007). In the same sample, this question predicted smoking cessation after eight

months (strongly disagree versus strongly agree, OR = 1.39, 95% CI: 1.06-1.82) (Yan, 2007). Therefore, this question has some evidence of validity.

Anti-tobacco industry attitudes

Criticism of tobacco companies is a strategy sometimes used in prevention campaigns. Good campaigns can modify attitudes towards these companies, which in turn may lower the risk of youth smoking initiation (Sly *et al.*, 2001a). Assessing anti-industry attitudes is therefore relevant in the context of programme evaluation. Two suggested items derived from the ITC surveys, “whether tobacco companies can be trusted to tell the truth about the dangers of their products”, and “whether they have tried to convince the public that there is no health risk from SHS,” should be included.

Validity: For the question on “whether the industry tells the truth,” the test-retest reliability in smokers in the ITC survey was $r=0.59$ (eight months apart) (Yan, 2007). For the question on “whether the industry tried to convince the public that SHS carries no risk,” the test-retest reliability was 0.45 (Yan, 2007). The figures are lower than usually recommended (Nunnally & Bernstein, 1994), but eight months may have been too long of an interval to assess test-retest for opinion items. In an analysis of daily smokers in the ITC surveys, the question on “whether the tobacco industry can be trusted to

tell the truth” predicted smoking cessation after eight months (neither agree nor disagree versus strongly agree, OR = 0.65, 95% CI: 0.43-0.97). The question on “whether the industry tried to convince the public that SHS carries no risk” also predicted smoking cessation (disagree versus strongly agree, OR = 0.76, 95% CI: 0.61-0.93) (Yan, 2007). These questions have adequate evidence of validity.

Concerns about exposing others to secondhand smoke (SHS)

Decreasing exposure to secondhand smoke (SHS) is a priority of the FCTC. Policies targeting SHS may affect smokers' concerns about exposing others to it, which justifies including this topic. Two suggested questions are “whether smokers think that their smoke is dangerous to those around them,” and “do smokers think about the harm their smoking might be doing to other people.”

Validity: In the ITC surveys, the test-retest correlation for the item “your cigarette smoke is dangerous to those around you” assessed eight months apart in daily smokers with no quit attempts, was moderate ($r=0.47$) (Yan, 2007). However, in an analysis of daily smokers, this question predicted smoking cessation after eight months (strongly agree versus strongly disagree, OR = 2.59, 95% CI: 1.03-6.46) (Yan, 2007). The test-retest correlation for the item on the harm done to other people assessed eight months apart in daily

smokers with no quit attempts, was also moderate ($r=0.50$). However, in an analysis of daily smokers, this question predicted smoking cessation after eight months (often or very often versus never, OR = 1.37, 95% CI: 1.16-1.62) (Yan, 2007). Therefore, these questions have some evidence of validity.

Motivational variables

Smoking susceptibility (adolescents)

To assess the susceptibility of taking up smoking, Pierce's Smoking Susceptibility Scale, a brief, three item, and widely cited measure intended for adolescents, is suggested (Pierce *et al.*, 1996).

Validity: Pierce's Smoking Susceptibility Scale has good predictive validity: in young never smokers, 6.5% of those with susceptibility ratings=0 had taken up smoking four years later, compared with 20.6% of those with ratings=3 (Pierce *et al.*, 1996). This scale can therefore be considered to have adequate validity, and the research papers describing it are widely cited (Pierce *et al.*, 1996; Choi *et al.*, 2001; Pierce *et al.*, 2005).

Intention to quit smoking

Intention to quit is a key predictor of smoking abstinence, as well as a key variable that policies and interventions intend to modify. Several approaches have been used to assess intention or

motivation to quit (Prochaska *et al.*, 1992; Sciamanna *et al.*, 2000). In particular, the concept of “stages of change” has been widely used. It proposes that people gradually progress towards smoking cessation through a series of stages, defined in particular by the level of motivation to quit (Prochaska *et al.*, 1992). Indeed, the two most widely cited papers in the smoking and tobacco literature, as ranked in the report by Byrne and Chapman (2005), describe the stages of change theory (Prochaska *et al.*, 1992, 1994). However, this theory has been criticized on the grounds that it does not accurately reflect reality, and that interventions based on it are no more effective than other interventions (West, 2005a). Furthermore, in the case of smokers unmotivated to quit (“pre-contemplators”), the stage of change theory recommends to prescribe interventions of doubtful efficacy (e.g. information on health risks) instead of effective treatments of dependence. This may be counterproductive if, for instance, the lack of motivation is due to the severity of dependence and to the intensity of withdrawal symptoms (West, 2005a). In addition, the stage of change is presented as a single variable describing behaviour change, when in fact it is a haphazard mix of four different elements (smoking status, intention to quit, past quit attempts, and duration of abstinence). Because this theory is so controversial, it should be used with caution, and reliance should instead be placed on more face valid measures of each of the four components of

stages separately. Smoking status and quit attempts are discussed in Section 3.1. Intentions may fluctuate even in short intervals of time (Hughes *et al.*, 2005). Therefore, it may be preferable to ask about immediate plans to stop, since reports of plans beyond the short-term may lack validity. A single question can be used on whether smokers are seriously thinking of quitting (No; Yes, but I have not decided when; Yes, I plan to quit within the next 30 days) (Table 3.21).

Validity: In daily smokers in the ITC survey, those who were not planning to quit were much less likely to have quit eight months later than those who planned to quit in the next month (OR = 0.16, 95% CI: 0.11-0.23) (Yan, 2007).

Quit date

Setting a quit date and sticking to it is a strategy recommended to smokers in major guidelines (Fiore *et al.*, 2000). A question on the planned quit date could be asked of those who plan to quit in the next 30 days (Table 3.21).

Validity: In daily smokers in the ITC survey with no quit attempts between the two assessments eight months apart, the test-retest reliability of the question on “whether smokers willing to quit had set a quit date” was low ($r=0.43$) (Yan, 2007). In addition, having set a quit date was not a significant predictor of cessation after eight months (no versus yes, OR = 0.75, 95% CI: 0.47-1.17) (Yan, 2007). This ques-

tion can nevertheless be retained because of its face validity and usefulness, and because eight months may have been too long of an interval for analyses exploring this construct.

Previous quit attempts: Quit attempts may be affected by policy interventions, and are therefore a relevant measure for policy evaluation. Having recently made a quit attempt predicts future cessation, and the duration of the longest time off smoking is a particularly good predictor of future cessation (Ferguson *et al.*, 2003; Hyland *et al.*, 2006). It is worthwhile to ask smokers about the occurrence and duration of recent quit attempts.

Self-efficacy

Self-efficacy is the confidence in one's ability to stop smoking or to abstain from smoking in relapse situations (e.g. when having a drink with smokers) (Bandura, 1986). Self-efficacy predicts cessation in current smokers (Etter *et al.*, 2000b) and relapse to smoking in former smokers (Gulliver *et al.*, 1995). There are several multi-item scales measuring self-efficacy across various relapse situations that have satisfactory validation data, in particular, predictive validity (De Vries *et al.*, 1988; Velicer *et al.*, 1990; Etter *et al.*, 2000b). However, these scales are too long for the purpose of policy evaluation, and single item measures may be preferable. A single item measure of self-efficacy derived from the ITC

survey that asks “whether respondents are sure that they would succeed if they tried to quit,” is suggested (Table 3.21).

Validity: The test-retest intraclass correlation for this self-efficacy item, assessed eight months apart in daily smokers with no quit attempts, was moderate ($r=0.51$) (Yan, 2007). However, in an analysis of daily smokers in the ITC surveys, this question predicted smoking cessation after eight months (extremely sure versus not at all sure, OR = 2.46, 95% CI: 1.68-3.59) (Yan, 2007). Therefore, this question has adequate evidence of validity.

Social influences, perceived social norms

Social influences are crucial in an adolescent’s decision to take up smoking (De Vries *et al.*, 1995). In many countries, social pressures also make it less acceptable for adults to smoke (Albers *et al.*, 2004). Including three questions derived from the ITC survey to assess social influences is recommended. These questions cover “whether others who are important to the respondent believe that they should not smoke,” “whether the respondent feels that there are fewer places where they feel comfortable smoking,” and “the respondent’s perception of the opinion that society disapproves of smoking.”

Validity: The test-retest intraclass correlation for these three items, assessed eight months apart in

daily smokers, was moderate ($r=0.42$, $r=0.40$, and $r=0.33$, respectively), but eight months may be too long of an interval to assess test-retest reliability of opinion questions. In an analysis of daily smokers in the ITC surveys, answers to the first two questions (“people believe...” and “fewer places...”) were not predictive of smoking cessation after eight months (Yan, 2007). However people who agreed with “society disapproves of smoking” were more likely to have quit eight months later than people who disagreed with this affirmation (OR = 1.34, 95% CI: 1.01-1.78) (Yan, 2007). In spite of their mixed performance on validation tests, these questions can be included because of their face validity and utility.

Moderators

Socio-demographic characteristics

Sociodemographic characteristics are strong determinants of smoking behaviour (Townsend *et al.*, 1994). Relevant variables include: age, sex, marital status and social support, socioeconomic status (education, income, occupation), ethnicity, primary language, minority group status, religion, family structure, peer and family smoking, country of residence and language of the interview (recorded by interviewer).

The most appropriate questions to assess sociodemographic characteristics vary between countries (e.g. for ethnicity, minority group status, education, etc.). Using either census ques-

tions in each country or standard questions from the World Bank surveys would be recommended (Grosh & Glewwe, 1998).

Other smokers in the household, friends who smoke

Workplace and home smoking restrictions are important policy outcomes, and in turn, they are relevant determinants of smoking behaviour. The presence of other smokers in the household decreases the chances of quitting smoking (Hymowitz *et al.*, 1997), and increases the risk of smoking initiation in nonsmokers (Conrad *et al.*, 1992; O’Loughlin *et al.*, 1998; Tyas & Pederson, 1998). To assess this, it is recommended that questions about “how many people in the household are smokers,” and “how many of the respondents’ five best friends are smokers,” be used (Table 3.21).

Validity: In the ITC survey, the test-retest intraclass correlation for the item on “how many of their five best friends smoke,” assessed eight months apart in daily smokers, was $r=0.64$ (Yan, 2007). In an analysis of daily smokers, this question predicted smoking cessation after eight months (four friends versus 0 friends OR = 0.63, 95% CI: 0.43-0.92) (Yan, 2007). Therefore, this question has adequate evidence of validity.

Peer and family smoking (5-items), adolescents only

Peer and family smoking predicts smoking initiation in adolescents

(Conrad *et al.*, 1992; O'Loughlin *et al.*, 1998; Tyas & Pederson, 1998).

A useful 5-item scale developed to assess the smoking status of family members and best friends has been developed (Pierce *et al.*, 1998c). This widely cited scale is intended for adolescents ages 12-17, and can be administered over the phone (Table 3.21).

Validity: Peer and family smoking were not strong predictors of susceptibility to smoke (Pierce *et al.*, 1998c) (OR = 1.19, non significant). Nevertheless, this scale can be used, as several other studies have shown the importance of peer and family smoking (Conrad *et al.*, 1992; O'Loughlin *et al.*, 1998; Tyas & Pederson, 1998). Also because this scale is widely used (cited by at least 227 articles), it enables comparison between samples.

Personality

Personality traits affect smoking behaviour. For instance, a heritable tendency for sensation seeking or for novelty seeking predicts smoking behaviour (Zuckerman *et al.*, 1990; Pomerleau *et al.*, 1992; Etter *et al.*, 2003a). Most personality questionnaires are too long to be used in policy evaluation surveys (Cloninger *et al.*, 1993; Barrett *et al.*, 1998); however, depending on the research goals, short versions of some personality questionnaires, such as for sensation seeking, have been validated and could be considered for inclusion (Hoyle *et al.*, 2002; Stephenson *et al.*, 2003).

Mental health

Smoking behaviour is strongly associated with mental health, including depression (Glassman *et al.*, 1990), which justifies the inclusion of a brief assessment of mental health in surveys of the general population. Among brief assessments suitable for general population surveys, evaluators can choose, according to their specific needs, between the WHO-5 Well-Being Index, which is a measure of mental well-being (Bonsignore *et al.*, 2001), and a 2-item screening test for depression (Whooley *et al.*, 1997). Mental health patients are often hard to reach and may not take part in population surveys. Because particular attention should be paid to this group, population surveys should be supplemented with specific surveys of mental health patients.

WHO-5 Well-Being Index (WHO-5)

Being a WHO product, the 5-item WHO-5 Well-Being Index (WHO-5) enables its users to compare their results with other WHO surveys (Table 3.21) (Bonsignore *et al.*, 2001).

Validity: Using the Composite International Diagnostic Interview (CIDI) as the measure, WHO-5 had a sensitivity of 93% and a specificity of 64% to detect depression in primary care patients (Henkel *et al.*, 2003). WHO-5 performed better than a clinical diagnosis to detect depression, using CIDI as the criterion (Henkel *et al.*, 2004a),

and can therefore be considered to have adequate validity.

A 2-item screening test for depression

A second way to assess depression in population surveys is to use a brief screening test, for instance, a widely cited 2-item test (Whooley *et al.*, 1997). This test screens specifically for depression, whereas WHO-5 monitors a broader index of mental health. Another possibility is to use Kessler's K-6 scale (a 6-item measure of psychological distress) (Kessler *et al.*, 2002). Finally, a question on whether the respondent has ever been diagnosed or treated for depression could also be included.

Validity: In patients without substance abuse, Whooley's 2-item test had a sensitivity of 96%, a specificity of 66%, and an area under the Receiver Operating Characteristic (ROC) curve of 0.84, using the Diagnostic Interview Schedule (DIS-II-R) as the criterion (Whooley *et al.*, 1997). The sensitivity of this 2-item scale was better than for the Center for Epidemiologic Studies-Depression scale (CES-D short) (84%) and for the Beck Depression Inventory (BDI short) (87%), and its specificity was similar or somewhat lower (CES-D short=75%, BDI short=67%) (Whooley *et al.*, 1997). In another study conducted in primary care patients, this 2 item test had a similar area under the ROC curve (0.859) compared with WHO-5 (0.862), and a comparable sensi-

tivity (92% versus 93% for WHO-5) and specificity (59% versus 64% for WHO-5), using CIDI as the criterion (Henkel *et al.*, 2004b). Whooley's 2-item screening test can therefore be considered to have adequate validity.

Alcohol use and abuse: Alcohol Use Disorders Identification Test (AUDIT-C)

Alcohol use and abuse is strongly associated with tobacco use, and, in former smokers, with relapse (Hymowitz *et al.*, 1991). This justifies the inclusion of a well-validated and widely cited test of alcohol use and abuse: the 3-item Alcohol Use Disorders Identification Test (AUDIT C) (Table 3.21) (Bush *et al.*, 1998; Reinert & Allen, 2002; Rumpf *et al.*, 2002).

Validity: The brief, 3-item version (AUDIT-C) performs as well as the full version of AUDIT to detect at-risk drinkers (Bush *et al.*, 1998; Reinert & Allen, 2002; Rumpf *et al.*, 2002). AUDIT-C has good sensitivity (54% to 98%) and specificity (57% to 93%) for various definitions of heavy drinking. AUDIT-C can therefore be considered to have adequate validity.

Discussion

An assessment of the psychosocial determinants of smoking is essential to understand how policies and interventions produce their effects, and how to improve them. Evaluation studies that neglect these elements lose an opportunity to help the field

progress towards more effective and acceptable interventions. Importantly, analyzing psychosocial factors is also an issue of social inequalities. Some interventions may have adverse effects in a number of subgroups, and interventions targeted at the general population may not reach several subgroups in which smoking prevalence is particularly high (e.g. mental health patients, some minorities).

The issue of translation and cultural adaptation of the measures described in this section are addressed elsewhere in this Handbook (Section 2.2). Depending on the construct under scrutiny, even well-translated questions may not be relevant, or may not be understood in a culture distant from where the instrument was initially developed (Beaton *et al.*, 2000). Many of the measures discussed here were developed in high-income, English-speaking countries, and there are very few data on their relevance or psychometric properties in other cultures.

Establishing a list of the psychosocial determinants of smoking is an impractical task that inevitably results in a list that is too long for some purposes, and too short for others. Such a list is potentially endless. The WG selected a core set of measures with general relevance for the evaluation of tobacco control programmes and policies. Their choice was based on influential theories of behaviour change, and in particular on a model derived from these theories: the conceptual framework of the ITC

project (Fong *et al.*, 2006a; Thompson *et al.*, 2006). This model was developed specifically for the evaluation of the FCTC, and it is therefore relevant for the purpose of this Handbook. The WG also included some elements believed to be important, such as mental health and substance use. Whenever possible, validated measures were included (psychometric validation studies were not always available). Some measures that were not well validated were nevertheless included because of their usefulness and face validity. The WG's selection was also based on a subjective assessment of what is useful and important. Thus, this list should be supplemented by other elements according to the specific needs of each study and country, and take into account new contributions to theory (West & Hardy, 2006). Even though this list is not comprehensive, the WG believes that it represents a core set of measures that are useful in analyzing how policies and interventions work, in which population groups they work, and why some interventions do not work. Progress in this field is possible only if thorough evaluations enlighten the path.

Summary and recommendations

This section describes mediators and moderators theorized to be important in understanding how policies and interventions affect tobacco use behaviours, and under what circumstances they

have an impact. A core set of measures likely to be important has been identified. Researchers should select from this list and, when appropriate, supplement it with other relevant measures, depending on the specific context and goals of each study. There are validated measures of many of the reviewed constructs, and researchers should, whenever possible, use them rather than develop their own ad hoc measures. Investigators should report the psychometric properties of their measurement instruments, and at least the test-retest reliability, convergent validity, and/or predictive validity. Psychological measures are particularly sensitive to wording and to cultural context; therefore, the methods for translations and cultural adaptations described in Section 2.2 should be utilised in populations where these measures have not been previously validated.