POSITIVE SMOKER IDENTITY: A DEVELOPMENT AND VALIDATION OF SMOKING CESSATION INSTRUMENT, AND ITS ASSOCIATED FACTORS.

by

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LIST OF SYMBOLS AND ABBREVIATIONS

Δ	Absolute precision
ANCOVA	Analysis of covariance
AOR	Adjusted Odd Ratio
BIC	Bayesian information criterion
CFA	Confirmatory factor analysis
CI	Confidence Interval
COPD	Chronic obstructive pulmonary disease
CSEQ-M	Cessation Self-Efficacy Questionnaire (Malay version)
CVI	Content validity index
CVR	Content validity ratio
df	Degrees of freedom
EFA	Exploratory factor analysis
FTND-M	Fagerstrom test of nicotine dependence (Malay version)
I-CVI	Item content validity index
IIS	Item impact score
IQR	Interquartile range
KMOMSA	Kaiser-Meyer-Olkin Measure of Sampling Adequacy
m	the ratio of control to case patients.
MYR	Malaysian Ringgit
NHMS	National Health Morbidity Survey
NNFI	Non-Normed Fit Index
NRT	Nicotine replacement therapy
OR	Odd ratio
P0	Proportion with attribute of interest in control group
P1	Proportion with attribute of interest in case group
PCA	Principal component analysis
PSmoQi	Positive Smoker Identity Questionnaire
r	Correlation coefficient
RMSEA	Root Mean Square Error of Approximation
ROC	Receiver operating characteristic
S-CVI	Scale content validity index
SD	Standard deviation

SEM	Structural equation modeling
Sn	Sensitivity
Sp	Specificity
SPSS	Statistical Package for Social Science
SSCS-M	Smoker Self-Concept Scale (Malay version)
UK	United Kingdom
USA	United States of America
USM	Universiti Sains Malaysia
VIF	Variance inflation factor
WHO	World Health Organisation
$Z\alpha$	Z value based on 95% confidence interval or normal deviates that reflects Type I error

ABSTRAK

IDENTITI PEROKOK POSITIF: PEMBENTUKAN DAN KESAHAN INSTRUMEN BERHENTI MEROKOK, DAN FAKTOR-FAKTOR YANG BERKAITAN DENGANNYA.

Adalah sangat penting untuk berhenti merokok kerana merokok merupakan penyebab kematian pra-matang dan morbiditi yang paling penting dan boleh dihindari. Identiti Perokok Positif ialah satu konstruk baru yang mewakili pemikiran, imej, dan perasaan positif perokok tentang tabiat dan budaya merokok. Objektif kajian ini adalah untuk menilai sifat-sifat psikometrik soalan kaji selidik yang dibentuk untuk mengukur Identiti Perokok Positif di kalangan perokok yang bekerja di jabatan-jabatan kerajaan di Kota Bharu, Kelantan, dan mengkaji prevalens dan faktor yang berkaitan dengannya. Satu kajian hirisan lintang telah dijalankan dari Mac 2017 hingga Mac 2018 menggunakan data yang diperoleh daripada perokok. Responden mengisi satu set proforma dan soalan kaji selidik termasuk PsmoQi, yang pada awalnya telah dibentuk dan diuji dari segi kesahan kandungan, muka dan konstruk dalam satu kajian rintis. Data dianalisa dengan R Software Versi 3.31. Dua ratus lima puluh tiga perokok, yang semuanya lelaki dan Melayu, menyertai kajian ini. Sebahagian besar daripada mereka mendapat pendidikan hanya sehingga sekolah menengah (52.2%), dari kalangan staf bawahan dalam jabatan (70%), berkahwin (88.9%), perokok harian (74.7%), menggunakan rokok biasa (96.4%), merokok di rumah (68%), mendapatkan rokok daripada kedai (90.9%), melaporkan tahap kesihatan yang baik (83.4%), kadang-kadang melihat kempen berhenti merokok di media (52.2%), dan menggunakan kebanyakannya rokok yang lebih murah daripada harga pasaran (55.3%). Faktor penyelesaian yang terbaik yang disahkan untuk item kaji selidik PsmoQi adalah penyelesaian 6-faktor,

dengan nilai Cronbach's alfa keseluruhan 0.77. PSmoQi dibuktikan mempunyai kesahan konvergen yang memuaskan, kesahan divergen yang baik, dan kesahan konkuren yang mencukupi dengan Skala Kendiri Perokok (SSCS-M). Prevalens responden yang memiliki Identiti Perokok Positif ialah 72.3%. Faktor yang berkaitan dengan Identiti Perokok Positif adalah umur (AOR: 1.042; 95% CI: 1.004, 1.081); p = 0.028), skor SSCS-M (AOR: 1.216; 95% CI: 1.112, 1.329; p < 0.001), indeks keberatan merokok (AOR: 1.002; 95% CI: 1.001, 1.004; p = 0.011), dan tahap pencapaian pendidikan (AOR: 0.458; 95% CI: 0.233, 0.900; p = 0.024). Kesimpulannya, PSmoQi adalah satu instrumen yang mempunyai kesahan dan kebolehpercayaan untuk mengukur konstruk Identiti Perokok Positif yang kaya dan dalam, dan akan menyokong analisa statistik parametrik dalam kajian berhenti merokok pada masa akan datang.

KATA KUNCI

identiti perokok, berhenti rokok, kesahan instrumen, faktor berkaitan, pembentukan soalan kaji selidik

ABSTRACT

POSITIVE SMOKER IDENTITY: A DEVELOPMENT AND VALIDATION OF SMOKING CESSATION INSTRUMENT, AND ITS ASSOCIATED FACTOR.

Smoking cessation was important because smoking has been the single most essential preventable cause of premature death and morbidity. Positive Smoker Identity was a new construct representing positive smoker thoughts, images and feeling about smoking behaviour and culture. The objectives of this study were to evaluate the psychometric properties of a questionnaire developed to measure Positive Smoker Identity among smokers in government agencies in Kota Bharu, Kelantan, and to study its prevalence and associated factors. A cross-sectional study was carried out from March 2017 to March 2018 using data collected from smokers. The respondents answered a set of proforma and questionnaires including PSmoQi, which was initially developed and tested for content, face and construct validity in a pilot study. Data were analysed using R Software Version 3.3.1. Two-hundred and fifty-three smokers, who were all male and Malay, participated in the study. Majority of them had attained secondary school education or lower (52.2%), were of lower job level (70%), were married (88.9%), smoked cigarette daily (74.7%), used conventional cigarette (96.4%), smoked at home (68%), got their cigarettes from shop (90.9%), reported good health status (83.4%), occasionally saw smoking cessation campaign in the media (52.2%), and used mostly cheaper-than-market-price cigarette (55.3%). The best factor solution confirmed for the PSmoQi items was a 6-factor solution, with an overall Cronbach's alpha of 0.77. PSmoQi was shown to have acceptable convergent validity, good divergent validity, and adequate concurrent validity with Smoker Self-Concept Scale (SSCS-M). The prevalence of respondents with Positive Smoker Identity was 72.3%. Factors associated

with Positive Smoker Identity were age (AOR: 1.042; 95% CI: 1.004, 1.081); p = 0.028), SSCS-M score (AOR: 1.216; 95% CI: 1.112, 1.329; p < 0.001), heaviness index (AOR: 1.002; 95% CI: 1.001, 1.004; p = 0.011), and educational attainment. (AOR: 0.458; 95% CI: 0.233, 0.900; p = 0.024). In summary, PSmoQi was a valid and reliable instrument to measure a comprehensively rich and deep Positive Smoker Identity construct, and would facilitate parametric statistical analyses in future studies on smoking cessation.

KEYWORDS

smoker identity, cigarette cessation, instrument validation, associated factors, questionnaire development

CHAPTER 1:

INTRODUCTION

1.1 Introduction

Cigarette smoking is the single most essential preventable cause of premature death and morbidity. Every year, cigarette use and exposure kill 6% of all female and 12% of all male globally, totalling 6 million people (WHO, 2015a). Ongoing trend demonstrates that the number of mortality due to cigarette use will rise from 5 million to 8 million annually by 2030 (WHO, 2015b). Furthermore, more than 600,000 innocent non-smokers died from exposure to second-hand smoke (WHO, 2016). Cigarette use is also figured to contribute to 42% of the chronic respiratory problem and almost 10% of cardiovascular illness (WHO, 2015a).

Global estimated age-standardized prevalence of daily tobacco smoking declined by 25% for men and by 42% for women between 1980 and 2012. The substantial population growth over this period contributed to a 41% increase in the number of male daily smokers and a 7% increase for female smokers. The number of cigarettes consumed worldwide increased by 26% during the same period, confirming that the global tobacco market continued to grow. During the past 3 decades, the pace of reduction in prevalence was greatest between 1996 and 2006 but was subsequently followed by a period of slower reductions at the global level.

A similar decrease in the prevalence of current smoking has been observed in Malaysia through several national surveys in the past decades (Table 1.1). The prevalence reduced

from 24.8% in 1996 (NHMS I 1996) to 21.5% in 2006 (NHMS III) and 19.3% in 2011 (NHMS IV) (Lim *et al.*, 2013). However, in 2015, the prevalence has increased back to 22.8% (NHMS V) (Mohd Yusoff *et al.*, 2015). In males, the prevalence decreased from 46.4% in 2006 (NHMS III) to 36.4% in 2011 (NHMS IV), before it increased again to 43.0%. Whilst in women, the prevalence has reduced steadily from 1.6% in 2006 to 1.5% (2011) and 1.4% (2015). A number of local studies conducted between 2001 and 2015 demonstrated the prevalence of smokers to be between 14%–69% (Ahmad *et al.*, 2001; Dahlui *et al.*, 2015; Khairani *et al.*, 2007; Lee *et al.*, 2005; Lim *et al.*, 2010; Naing *et al.*, 2004) .

Table 1.1: Prevalence of current smoking in Malaysia.

Prevalence	**NHMS 1996**	**NHMS 2006**	**NHMS 2011**	**NHMS 2015**
Total	24.6	21.5	19.3	22.8
Male	-	46.6	36.4	43.0
Female	-	1.6	1.5	1.4

WHO reported that the single most effective and efficient programme of bringing down the prevalence of cigarette use is raising the taxes programme (WHO, 2015c). It is the best-buy demand reduction measures to reduce cigarette use. However, the more important programme than raising tax alone would be the cigarette cessation programme. Raising tax without combining with cessation programmes would raise an ethical issue of not giving many alternatives to the cigarette user. As nicotine addiction has widely been accepted as an illness (Dani *et al.*, 2011), not giving a treatment would be considered as unethical.

The importance of smoking cessation also lies in the fact that despite the total number of adolescent smokers in the developed country (United States) has declined in the past few years, the decline is attributed to a decrease in the numbers of people beginning to smoke and smokers aging out of the adolescent age group, not to an increase in the number of people who stop smoking (Johnston *et al.*, 2008). According to WHO, tobacco cessation service is the most under-implemented MPOWER measure in terms of the number of countries that have fully implemented it. About 1.1 billion people had access to appropriate cessation support, an increase from 13% in 2012 to 15% of the world's population in 2014 (WHO, 2015c).

1.2 Problem Statement

There are a lot of barriers to utilization and effectiveness of smoking cessation services. They included healthcare systems (Curry *et al.*, 2008; Manley *et al.*, 2003; Kaper *et al.*, 2005; Warner *et al.*, 2004; Titlow *et al.*, 2000), parents (Kealey *et al.*, 2007), employers (Javitz *et al.*, 2004; Levy, 2006; McPhillips-Tangum *et al.*, 2006), clinicians (Ferketich *et al.*, 2006; Quinn *et al.*, 2005; Torrijos and Glantz, 2006; Borrelli and Novak, 2007; Meredith *et al.*, 2005; Vogt *et al.*, 2005), healthcare workers (Houston *et al.*, 2005; Cokkinides *et al.*, 2005; Fiore *et al.*, 2008) and the smokers themselves (Orleans, 2007; Cokkinides *et al.*, 2005; Backinger *et al.*, 2003; Bansal *et al.*, 2004).

Smokers' readiness and motivation to quit have been studied and been shown to be important factors in cessation success (Riedel *et al.*, 2002; Herzog *et al.*, 2000). Smoking cessation programmes have incorporated may theories into practices, for examples Transtheoretical Stage of Change Model (Velicer *et al.*, 2012; Armitage *et*

al., 2004), Social Cognitive Theory (Bandura, 2011; Bembenutty *et al.*, 2016), Protection Motivation Theory (C Clubb and Hinkle, 2015; Pechmann *et al.*, 2003) , Health Belief Model (Sharifi-rad *et al.*, 2007), Theory of Planned Behaviour (Ajzen, 2012; Higgins and Conner, 2003), and Social-Ecological Model (Wen *et al.*, 2009), . However there were mixed results in term of the efficacy of the cessation intervention programmes anchored in these theories (Riemsma *et al.*, 2003;Milne *et al.*, 2000; Carpenter, 2010; Armitage and Conner, 2001), not to mention the critiques and limitations of these theories (Sutton, 2001; Ajzen and Fishbein, 2004; Ajzen, 2011).

1.3 PRIME Theory

PRIME Theory of West is one of the newest theories which explain behaviours especially addictive ones using a dynamic model. This theory explains the complexity of why people continue or stop smoking using five levels of motivational system (Figure 1.1) including responses, impulses, motives evaluations and plans (West, 2007). West defines identity as 'thoughts and images of ourselves and how we feel about these.' Thoughts are classified into 'labels' (the categories to which we consider that we belong, e.g., smoker), 'attributes' (the features we ascribe to ourselves, e.g., rebellious), and our 'personal rules' (the things that we do and do not do, e.g., not smoke indoors). Identity is part of mental representations of ourselves and the feelings attached to these. Identity is a potentially important source of motives, is the ultimate source of self-regulation and is a major source of stability of behaviour.

Positive smoker identity, or sometimes called as the smoker identity, is one's positive feelings attached to the identity as a smoker. It includes positive thoughts and positive

images of a person's cigarette smoking act and his or her positive feeling about smoking. Positive smoker identity incorporates thoughts of belonging to the smoker category or label. For example, those smokers who do not have positive smoker identity might incline towards being labelled as non-smoker category rather than the smoker category. Those with positive smoker identity may have a more unmanageable attribute, purchase their own cigarette rather than getting cigarette using other means, smoke indoor or anywhere, and do not really care what others think about them smoking. Positive smoker identity could be assessed by the endorsement of the statement 'I like being a smoker'. Positive smoker identity would be expected to deter smokers from trying to quit.

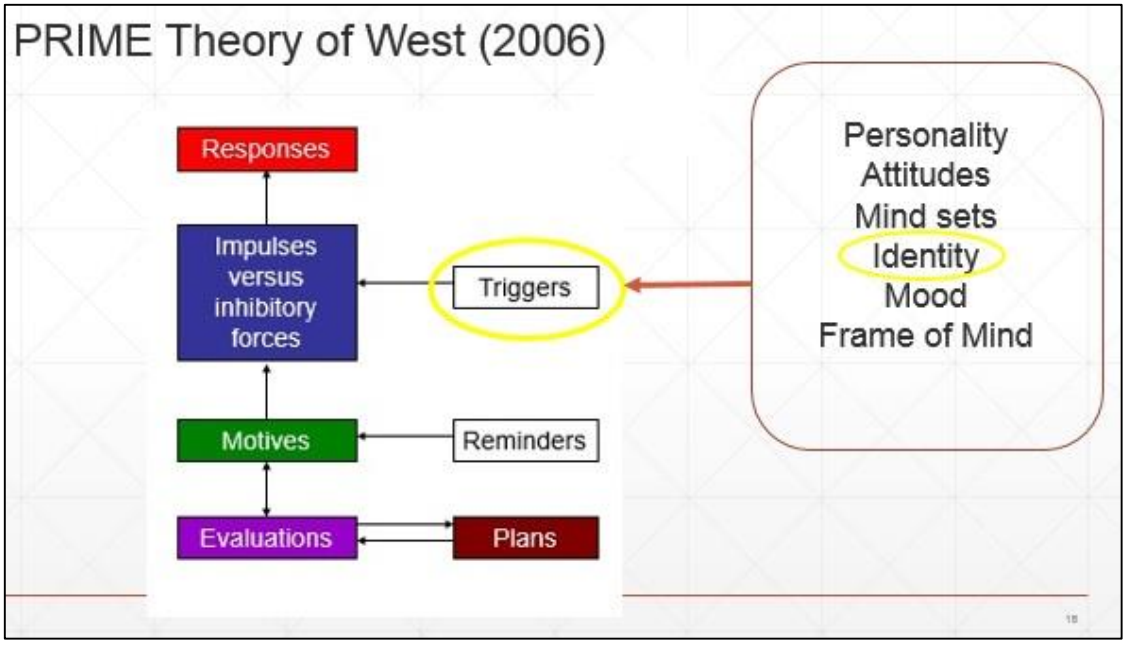

Figure 1.1: Conceptual framework of PRIME Theory of West

1.4 Research gap, rationale and the benefits of the study

Most studies on smoker identity were qualitative, and those quantitative studies used single 'yes or no' question as an indication of whether a smoker had a positive smoker identity or not. Thus this measure would not capture the complexity and richness of this construct. To our best knowledge, there is no established and validated smoker identity measure available in Malaysia at the moment. The only validated tool similar to positive smoker identity construct is Five-item Smoker Self-Concept Scale by Shadel and Mermelstein (1996) who used self-concept measure of Social Cognitive Conception.

Smoking cessation is important to prevent associated morbidity and mortalities. Positive smoker identity may possibly predict smoking cessation attempt, success or failure. Currently, there is no known established and validated a measure of positive smoker identity in any country. Shadel and Mermelstein (1996) validated a Five-item Smoker Self-Concept Scale which measure self-concept construct in Social Cognitive Conception with an alpha-coefficient of 0.74. The self-concept of Social Cognitive Conception may possibly be similar to the smoker identity construct of PRIME theory. However, the sample and population of the study, place, time, scenario and situational circumstances of the study were totally heterogeneous with the current study.

This study held significance for Malaysia health care policymakers, who were confronted with escalating healthcare costs. The PSmoQi questionnaire could possibly assist in matching smokers with strategies and interventions that are more likely to help them quit, and to make the most of healthcare resources. A study (Shafie *et al.*, 2016) showed the average costs per quitter, per patient and per quit attempt were MYR 953.28

(USD 308), MYR 55.71 (USD 18) and MYR 34.74 (USD 11) respectively. The cost might be substantially reduced if we could identify smokers who are more likely to stop smoking and prioritize smoking cessation programmes in order to achieve better effectiveness and efficiency.

In addition, the PSmoQi construct may be utilized as an indicator, or at the very least, as a proxy indicator to one of the four main WHO criteria for "Tobacco Endgame" goal -"denormalization" of smoking behaviour in the society - which is yet to have a proper objective scale for measurement. Hence, the PSmoQi could become a handy instrument to fairly quantify how positive or normal an individual perception of cigarette smoking behaviour and industry. By conducting a large-scale study or census in a society, nationwide or worldwide, PSmoQi could be crucial in providing data to all stakeholders on the status of 'positivity' or 'normality' of cigarette smoking in their area, how much has been done to 'denormalize' the cigarette smoking norm and how much more should be done. These are the unknowns which will be uncovered with the availability of PSmoQi questionnaire, which is a very novel motive and platform for the success of the "Tobacco Endgame" initiative.

This study made a fruitful input to both the basic and applied research on Positive Smoker Identity and smoking cessation. The absence of a validated method for measuring Positive Smoker Identity illustrated a void in the current literature. This study strengthened the basic research by exploring whether this latent variable or construct was gaugeable, which had ramifications to other researchers who were trying to measure similar constructs. Furthermore, a measure of Positive Smoker Identity that permitted valid inferences about strong smoker identity set an example for applicable

cut-off point of this construct and facilitated parametric statistical analyses in smoking cessation research.

1.5 Research Questions

a) Is the Positive Smoker Identity Questionnaire (PSmoQi) valid and reliable to be used to measure positive smoker identity among adults in government agencies in Kota Bharu, Kelantan?

b) Does PSmoQi have good predictive validity, concurrent validity, convergent and divergent validity, specificity and sensitivity?

c) What is the prevalence of adults with Positive Smoker Identity in government agencies in Kota Bharu?

d) Is there any association between socio-demographic profiles, smoking behaviours, quit attempts behaviours, nicotine dependence, health status, awareness towards stop smoking campaign, economics and cost of smoking, readiness to stop, self-efficacy and smoker self-concept with positive smoker identity among adults in government agencies in Kota Bharu?

1.6 Objectives

1.6.1 General Objective

To evaluate the psychometric properties of a questionnaire developed to measure positive smoker identity (PSmoQi) in adults in government agencies in Kota Bharu, Kelantan.

1.6.2 Specific Objectives

Objective 1: To develop and validate a questionnaire (PSmoQi) which can measure positive smoker identity in adults in government agencies in Kota Bharu, Kelantan.

Objective 2: To confirm the factor structure, predictive validity, concurrent validity, convergent and divergent validity, specificity and sensitivity of the PSmoQi questionnaire.

Objective 3: To determine the prevalence of adults with Positive Smoker Identity in government agencies in Kota Bharu, Kelantan.

Objective 4: To determine the association between socio-demographic profiles, smoking behaviours, quit attempts behaviours, nicotine dependence, health status, awareness towards stop smoking campaign, economics and cost of smoking, readiness to stop, self-efficacy and smoker self-concept with positive smoker identity among adults in government agencies in Kota Bharu, Kelantan.

1.7 Research Hypothesis

a) The Positive Smoker Identity Questionnaire (PSmoQi) is a valid and reliable tool to be utilized in measuring the smoker identity construct among adults.

b) PSmoQi have good predictive validity, concurrent validity, convergent and divergent validity, specificity and sensitivity.

c) There are significant associations between socio-demographic profiles, smoking behaviours, quit attempts behaviours, nicotine dependence, health status, awareness towards stop smoking campaign, economics and cost of smoking, readiness to stop, self-efficacy and smoker self-concept with positive smoker identity among adults in government agencies in Kota Bharu, Kelantan.

CHAPTER 2:

LITERATURE REVIEW

2.1 Smoker identity construct

Little research was published on smoker identity. It was shown that both adult (Vangeli and West, 2012) and young smokers (Johnson *et al.*, 2003) reported shifting between different smoker identities (e.g., from 'smoker' to 'non-smoker') during the process of cessation. There was also some evidence that smokers made efforts to distance themselves from their unwanted smoker identity (Brown *et al.*, 2011; Hoek *et al.*, 2013). But often this identity transition was not sufficient to achieve long-term abstinence, and they could carry on smoking secretly (Thompson *et al.*, 2009) or occasionally (Brown *et al.*, 2011; Hoek *et al.*, 2013). Young smokers with a strong non-smoker identity were more likely to remain abstinent when compared with heavy smokers with an established smoker identity, even though they also reported negative feelings about smoking and being a smoker (Johnson *et al.*, 2003).

Quantitative studies suggested potential discrepancies between smoker identity and behaviour, that was, despite smoking cigarettes people denied being a smoker (Berg *et al.*, 2009; Choi *et al.*, 2010; Levinson *et al.*, 2007; Ridner *et al.*, 2010). Those denying their smoker identity tended to be younger, male (Berg *et al.*, 2009), to smoke occasionally (Levinson *et al.*, 2007) and to not have made a quit attempt in the past year (Berg *et al.*, 2009). There was some evidence that having developed a smoker identity was associated with smoking escalation in adolescents (Hertel and Mermelstein, 2012) and resistance to anti-tobacco messages (Falomir and Invernizzi, 1999; Freeman *et al.*,

2001). Smokers with a smoker identity were found in two studies of specific groups of smokers to be less likely to intend to (Falomir and Invernizzi, 1999) and make a quit attempt (van den Putte *et al.*, 2009). Moreover, smoker self-concept and abstainer self-concept at baseline were reported to be important factors in predicting the success of smoking cessation treatments among adults (Shadel and Mermelstein, 1996). Having a positive smoker identity, as measured by agreement with the statement 'I like being a smoker', was associated with being older, male, reporting stronger nicotine dependence, lower motivation to stop smoking and not having made a quit attempt in the past year (Tombor *et al.*, 2013). Table 2.1 showed studies which explored the smoker identity construct, and the question(s) used to represent the construct.

Table 2.1: Smoker identity construct measurements in literatures

Studies	Population	Smoker Identity Construct	Question(s) used
(Berg *et al.*, 2009) Minnesota, USA	College students	Yes or No	Do you consider yourself a smoker?
(Choi *et al.*, 2010) Michigan, USA	University students	Yes or No	Do you consider yourself a smoker?
(Levinson *et al.*, 2007) Denver, USA	College students	Yes or No	Do you consider yourself a smoker?
(Ridner *et al.*, 2010) Kentucky, USA	College students	Single item response choices.	Which of the following best describes you? (non-smoker, smoker, occasional smoker, and social smoker.
(Hertel and Mermelstein, 2012) Chicago, USA	High school students	Two continuous Likert-scale items & a categorical scale item.	1. How much is being a smoker part of who you are? (1- not at all, to 4-a lot). 2. How important are cigarettes in your life? (1-not at all important, to 5-the most important) 3. Which of the following best describes how you think about yourself?

			(1=smoker, 2=social smoker, occasional smoker, 3=ex-smoker, 4=someone who tried smoking, 5=non-smoker).
(Falomir and Invernizzi, 1999) Spain	Secondary school students	Three response scale items. (1= a little, to 7= a lot)	1. To what extent you feel you are a real smoker? 2. To what extent your friend see you as a real smoker? 3. To what extent do you identify with smokers?
(Shadel and Mermelstein, 1996) Chicago, USA	Clinic-based smoking cessation programme adult clients	Five-item Smoker Self-Concept Scale (1=strongly disagree, to 7=strongly agree)	1. Smoking is part of my self-image. 2. Smoking is part of "who I am." 3. Smoking is a part of my personality. 4. Smoking is a large part of my daily life. 5. Others view smoking as part of my personality
(Tombor *et al.*, 2013) UK	National adult survey	Yes or No	I like being a smoker
(Tombor *et al.*, 2015a) UK	Adult household survey	Yes or No	I still think of myself as a smoker

2.2 Prevalence and factors associated with Positive Smoker Identity

The strength of the study by Berg *et al.* (2009) was contributed by their relatively large sample size (9931 participants) and multivariate analysis using binary logistic regression. They also showed that young smokers who denied being a smoker were more likely not attempting to quit smoking. This finding demonstrated how young smokers who had non-smoker identity (negative smoker identity) behaved differently from adult smokers who had non-smoker identity in term of quit attempts. However

Berg *et al.* (2009) included only participants among young college students, used yes or no question only for identifying smoker identity construct, had low response rate (41.6%), and thus lack accurate assessment of the prevalence data (although the prevalence of Positive Smoker Identity recorded as 49.3%).

Choi *et al.* (2010) who used the term "phantom smoker" to indicate smokers with non-smoker identity observed that the prevalence of positive smoker identity was 26.2%. Choi *et al.* (2010) also found that phantom smokers smoked less in terms of amount and frequency than smokers with Positive Smoker Identity. Phantom smokers were more likely to smoke in social situations, especially in a bar or with friends, whereas self-identified smokers tended to smoke across a range of social and other situations, including when they were alone or engaged in other activities such as driving and eating. The weakness of this study was the usage convenience sampling in subject selection, the usage of a single yes or no question for assessing a smoker identity construct, and the lack of control of the other confounding effects by just controlling 3 variables in ANCOVA (gender, ethnicity and college class rank).

Levinson *et al.* (2007) attempted to identify if there was any difference in response to a question asking whether a respondent was a "smoker" or a "social smoker". This study compared the difference using bivariate probit regression as two models were computed on the same subjects, who were college students. This finding's strength was its focus in deeply scrutinizing the term "social smoker" in comparison to "occasional smoker" and non-smoker identity. The prevalence of smoking students who admit their smoker status (Positive Smoker Identity) was 43.5%, which was comparable to 44.0% prevalence of smoker who admitted that they smoked beyond a social motive. The

limitations of the study included the use of convenience sampling, the usage of a single yes or no answer to capture Positive Smoker Identity construct, and a low response rate of 45%.

Ridner *et al.* (2010) noticed that there was a significant difference in smoking rate based on how individuals described themselves. Individuals who self-described as non-smokers had the lowest current smoking rate (4.6%) when compared to individuals who self-described as smokers (97.5%). The strength of this study was their spotlight on the discordance (disagreement) between the empirical classification of whether an individual was a current smoker or a non-smoker and an individual's self-described smoking identity. However, their response rate of 18.5% and the predominance of female respondents (61%) limited the generalizability of their result. The richness and depth of Positive Smoker Identity construct could not be apprehended due to the usage of a single yes or no answer for smoker identity. Furthermore, their usage of simple chi-square test in the analysis discovered the strength of a relationship but not the model of the determinants and the likelihood of a Positive Smoker Identity prediction. The prevalence of Positive Smoker Identity in this study was 33.1%.

The work done by Hertel and Mermelstein (2012) was quite interesting because of their interest in the relationship between the smoker identity during adolescence and the smoking escalation (more frequent smoking) later in life. What they found was the more adolescents thought smoking was a defining aspect of who they were, the more likely their smoking escalated. The 24-month cohort study design and the adoption of self-concept in the Prototype/Willingness model (Elliott Mark *et al.*, 2017) and the Theory of Planned Behaviour (Ries *et al.*, 2012) demonstrated the strength and solid conceptual

background of their study. The limitations of the study were the usage of brief measures of the key constructs (two continuous Likert-scale items & a categorical scale item), the finding of correlational relationships which precluded claims about the causal effects of smoker identity, and the fact that the data for the study were derived from a larger parent study. This parent study had measures of multiple psychosocial constructs, but none was designed to directly address constructs related to the Prototype/Willingness Model or Theory of Planned Behaviour.

Falomir and Invernizzi (1999) showed that the smoker identity contributed to a decrease in the impact of the anti-tobacco message on smokers' attitude towards giving up smoking. The uniqueness of the study appeared from its experimental design, in which they randomly assigned participants into two groups. One group was the control group which did not receive any anti-tobacco message, and another group was the experimental group which received anti-tobacco campaign. However, their limitation was that they used three response scale items to identify Positive Smoke, which lacked dimensions and range of the construct.

Tombor *et al.*, (2013) was one of the biggest prospective cohort study on Positive Smoker Identity with a sample of 9456 at baseline and 2099 were followed up at 6 months. Using multiple logistic regression, they found out that positive smoker identity was more likely to be older, male, more nicotine dependent, have lower motivation to stop, have not made a quit attempt in the past year, enjoy smoking, and consider themselves to be addicted. They also reported that having a positive smoker identity independently predicted failure to make a quit attempt at six months. The prevalence of Positive Smoker Identity was 18.3% in this study. However, similar to other studies on

Positive Smoker Identity, the construct was measured only by a single yes or no question, which was devoid of complexity and richness. The same authors did another study (Tombor *et al.*, 2015a) which now focused on ex-smokers who already quit smoking in the past 1 year. This time 574 ex-smokers who quit smoking in the past year were followed-up at three and six months. Tombor *et al.* (2015a) discovered that the majority of people (80.3%) who quit smoking recently consider themselves as non-smokers. Younger people and those who have been abstinent for longer were more likely to take on a non-smoker identity. Nevertheless, the usage of single yes or no question to identify respondent with Positive Smoker Identity remained in this study. Table 2.2 showed the prevalence and factors linked, correlated or associated with Positive Smoker Identity in various studies.

Table 2.2: Prevalence of Positive Smoker Identity and its linked, correlated or associated factors

Studies	Prevalence	Factors
(Berg *et al.*, 2009) Minnesota, USA	49.3%	Older Female Attended 2-year (versus 4-year) college No alcohol consumption in last 30 days More attempts to quit
(Choi *et al.*, 2010) Michigan, USA	26.2%	Smoked everywhere in all situations Smoked while driving Bought cigarette for themselves Smoked more number of cigarettes in last 30 days Senior students (versus freshmen) Had more negative affect reduction Had more social facilitation More smokers in their social network Felt more peer pressure to quit smoking Felt more peer pressure to modify smoking behaviour
(Levinson *et al.*, 2007) Denver, USA	43.7%	More frequent smoking Increased smoking after entering college Most close friends were smokers

		Wanted to quit smoking More addicted to smoking Smoked when drinking More failed attempts Preferred to date smokers Did not advocate tobacco-free campus
(Ridner *et al.*, 2010) Kentucky, USA	33.1%	Higher smoking rate More frequent smoking
(Hertel and Mermelstein, 2012) Chicago, USA	Not documented	Smoking escalation
(Falomir and Invernizzi, 1999) Spain	Not documented	Smoking behaviour Decreased intention to give up smoking Lack of behavioural control More number of cigarettes Longer duration of smoking Less intention to quit More motivated to cope with threat to their identity Overestimated social support on behaviour
(Shadel and Mermelstein, 1996) Chicago, USA	Not documented	Cessation failure Lower chance of being abstinent
(Tombor *et al.*, 2013) UK	18.3%	Older Male Stronger nicotine dependence Lower motivation to stop smoking Not having made quit attempt in the past year Enjoyment of smoking Addiction to smoking Lower confidence in ability to quit smoking No current and future health concern No concern about effect of smoking on family Higher cost of smoking Less quit attempts
(Tombor *et al.*, 2015a) UK	19.7%	Older Shorter duration of abstinence Needed aids for quitting

2.3 Conceptual framework

Briefly, a few existing theories of identity or self-concept contributed a theoretical lens from which to view Positive Smoker Identity. Specifically, PRIME Theory of West (West, 2007) was used as a categorization framework for the development of this construct. The construct was incorporated into the "Smokers component" in the smoking cessation chain. The blending of "Smokers" component with other components such as "Health system", "Parents", "Employers", and "Clinicians/Health care workers" components would hypothetically and scientifically lead to the final outcomes in smoking cessation chain, which were quit attempts, smoking reduction and smoking cessation (Figure 2.1). The work of Curry et al. (2008), Kaper et al. (2005), Warner et al. (2004), Levy (2006), Kealey et al. (2007), McPhillips-Tangum et al. (2006), Ferketich et al. (2006), Meredith et al. (2005), Houston et al. (2005), Backinger et al. (2008), Bansal et al. (2004) and Cokkinides et al. (2005) were utilized as these researchers studied a wide range of predictors that affected smoking cessation outcomes.

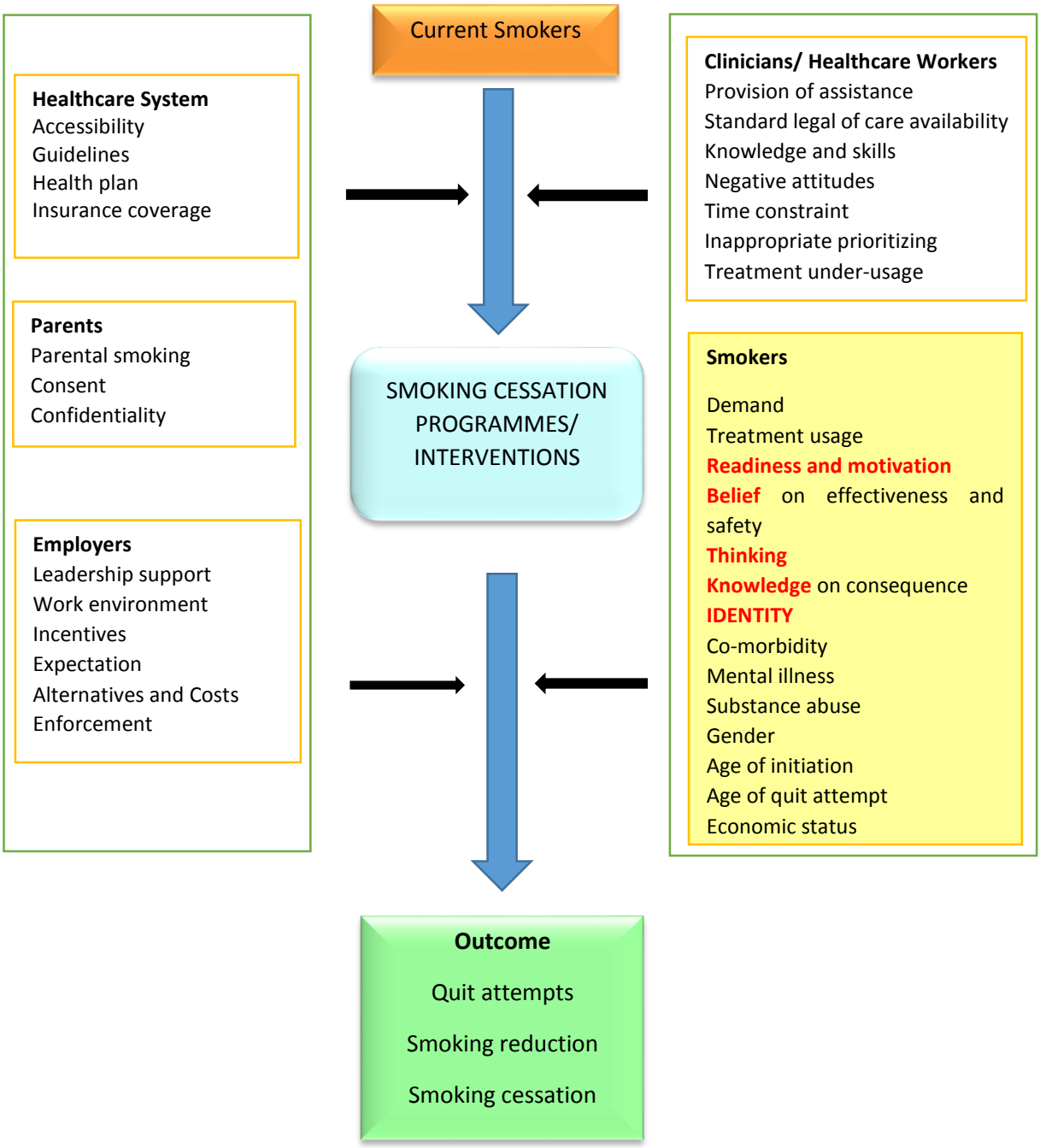

Figure 2.1: Conceptual framework of the study

CHAPTER 3

METHODOLOGY

3.1 Research Methodology Phase 1 (PSmoQi Questionnaire Development and Validation Study)

3.1.1 Construct development

3.1.2 Content validity

3.1.3 Face validity

3.1.4 Pilot test of the construct

3.1.5 Construct validity: a factor analysis.

3.1.6 Reliability tests: internal consistency (Cronbach's alpha)

3.1.1 Construct development

We produced an initial collection of question items based on a comprehensive review of empirical and theoretical literature, existing scales and expert opinions. The initial item pool was derived from a meta-ethnography study (Tombor et al., 2015b). It contained 20 items in four domains (Figure 3.1). On top of that, a comprehensive literature review identified personal and environmental factors associated with smoking. Five professional experts including a tobacco questionnaire expert, a smoking cessation specialist, a specialist in health promotion and health management, a family health expert and a questionnaire validation and statistic specialist contributed to the development of the questionnaire. The PRIME theory framework was used to conceptualize the items. The domains and items were reviewed for appropriateness of

the content by the team. Together the team and the author decided for which domains and items to be included or excluded. The team also discussed each item included in order to improve its clarity and to determine its initial order and basic grouping. Further extensive review of other qualitative and quantitative literature, and expert viewpoints had increased the number of items to 75. These 75 items represented the preliminary group of question items within the above 4 domains (Section A, B, C and D) plus a 1-item domain (preparedness in stop smoking), namely Section E.

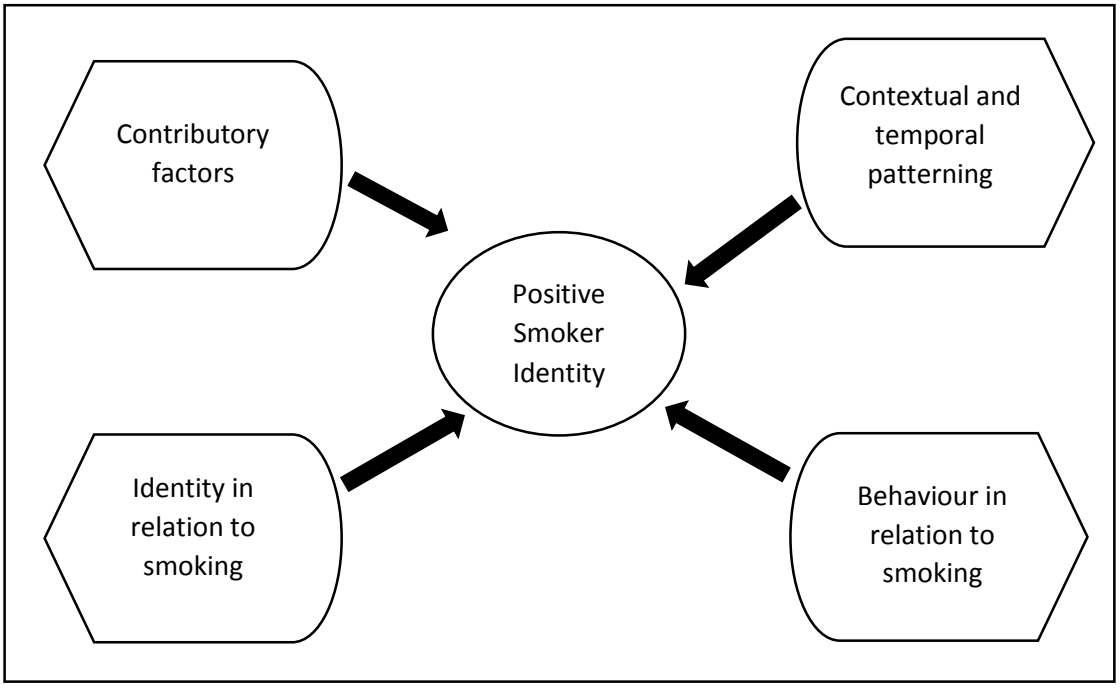

Figure 3.1: Four domains under positive smoker identity construct.

3.1.2 Content validity

The content validity of the instrument was determined using the viewpoints of the panel experts. This panel consisted of the above specialist team of 5 experts and 10 lay experts

who were conveniently chosen among smokers in Hospital USM visitors. Apart from qualitative content validity method (whereby the panel experts observed the grammar, the usage of appropriate and correct words, and the application of the correct and proper order of sentences), content validity was also quantified by Content Validity Index (CVI) and Content Validity Ratio (CVR).

For CVI, panel members were asked to rate instrument items in terms of clarity and its relevance to the construct underlying the study. This rating was done according to the theoretical definitions and structures of the construct itself and its dimensions on a 4-point ordinal scale (1=not relevant, 2=somewhat relevant, 3=quite relevant, and 4=highly relevant). To obtain a content validity index for relevancy and clarity of each item (I-CVIs), the number of those raters judging the item as relevant or clear (rating 3 or 4) were divided by the number of content experts. However, for relevancy, CVI was calculated both for item level (I-CVIs) and the scale-level (S-CVI). As a new instrument, the criterion of .80 as the lower limit of acceptability for an S-CVI was used (Shi *et al.*, 2012). Further analysis with multi-rater kappa statistic was included. After controlling items by calculating adjusted kappa, each item with I-CVI equal or higher than 0.78 was considered excellent (Polit *et al.*, 2007).

For CVR, the panel experts were requested to specify whether an item was necessary for operating a construct in a set of items or not. They were requested to score each item from 1 to 3 with a three-degree range of "not necessary, useful but not essential, and essential" respectively. The numeric value of content validity ratio was determined by Lawshe table (Ayre and Scally, 2014). In the current study, if CVR was bigger than

0.49, the item in the instrument which had an acceptable level of significance was accepted.

The last step of measuring the content validity was by requesting the panel members to judge whether instrument items and any of their dimensions were a complete or a comprehensive sample of content as far as the theoretical definitions of concepts and its dimensions were concerned. The dimension of completeness or comprehensiveness was on a 4-point ordinal scale (1=not complete, 2=somewhat complete, 3=quite complete, 4=highly complete). Panels were also asked whether to eliminate or to add any item. According to members' judgment, the proportion of agreement was calculated for the comprehensiveness of each dimension and the entire instrument. Thereafter, the number of experts who identified instrument comprehensiveness as favourable was divided into the total number of experts (Polit and Tatano Beck, 2006).

3.1.3 Face validity

To determine face validity of an instrument, researchers adopted panel experts' viewpoints including 10 lay respondents' opinion. Researchers carried out face-to-face interviews with them. The difficulty level of items, desired suitability and relationship between items and the main objective of an instrument, readability, ambiguity and misinterpretations of items, and/or incomprehensibility of the meaning of words were the issues discussed in the interviews. The experts were asked to identify the items they thought are the most important for them, and grade their importance on a 5-point Likert scale (1=unimportant, 2= slightly important, 3=relatively important, 4=important, 5=very important).