

**The Association between Religiosity and Tobacco
Use among Muslim Primary School Students in
Irbid, Jordan**

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Abstract

Background: The smoking of tobacco, by the use of cigarettes and water pipe, among children and adolescents has reached epidemic levels in the Middle East. There is evidence of a relationship between religiosity and tobacco use, namely that Muslim youth with higher religiosity engagement are less likely to smoke tobacco, which is in line with some of the Islamic doctrine on tobacco use. However, previous research has only focused on the number of days of religious engagement and has not examined the multiple factors of religiosity. The purpose of this study was to examine the relationship between religiosity and tobacco use among Muslim primary school students in Irbid, Jordan.

Methods: A pilot repeated cross-sectional study was conducted in 2015 among Muslim school children enrolled in the 5th and 6th grades in the Irbid Governorate in the north of Jordan and followed up one year later. This thesis has developed a multidimensional measure of religiosity for Muslim youth in Jordan adapted from one developed for Muslim adults (El-Menouar, 2014) itself based on the Glock (1962) model of religiosity. This tool was utilised in the repeated cross-sectional study of Muslim youth in Irbid, Jordan. Multivariable logistic regression analyses were performed to measure the association between religiosity and tobacco smoking, both in 2015 only and pooling data from 2015 and 2016.

Results: Nine hundred and twenty-six youth enrolled at baseline. The rates of ever-smoked for cigarettes and water pipes in 2015 were 15% and 36% respectively. This research developed statistical models of tobacco use to examine recognised demographic, family and peer influences, and family attitudes on tobacco use. The

models then included of religiosity factors to examine their impact on the smoking outcomes. A four-factor model of Muslim children's religiosity was developed comprised of Experience & Orthopraxis; Knowledge; Belief; and Devotion & Practice. Statistical analysis indicates that the scales are reliable and internally valid. The religiosity factor of Devotion and Practice demonstrated a protective effect, as did perceptions of the ruling on smoking in Islam. In addition, there was evidence that different factors, sex and parental attitudes in particular, related to cigarette and water pipe use within this population.

Conclusions: This is the first repeated cross-sectional study to examine the association between religiosity and prevalence of smoking cigarettes and/or WP among adolescents using a modified multidimensional religiosity scale for Muslim primary school children in Islamic societies. The results indicate that religion can be a protective factor in child smoking behaviour. Religiosity therefore can be used at this stage as an anchor to guide behaviour. In summary, this research has demonstrated that religiosity can be an important anchor for this population to develop programs to assist in guiding tobacco use behaviour.

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List of abbreviations

AUT	Auckland University of Technology
AUTEC	Auckland University of Technology Ethics Committee
CDC	Centers for Disease Control and Prevention
EMR	Eastern Mediterranean Region
GYTS	Global Youth Tobacco Survey
JOD	Jordanian dinar
MENA	Middle East and North Africa
PBUH	Peace Be Upon Him (Prophet Muhammad)
SCT	Social Cognitive Theory
WHO	World Health Organization
WP	Waterpipe
JUST	Jordan University of Science and Technology
EFA	Exploratory Factor Analysis
FCTC	Framework Convention on Tobacco Control
SES	Socioeconomic Status

List of Islamic Glossary

Haram	Anything that is prohibited (Forbidden) in the Qur'an or would result in sin when committed by a Muslim. For example adultery, murder or money obtained through cheating or stealing.
Halal	The opposite of Haram is Halal, which means permissible according to Islamic law.
Makruh	Disliked or offensive, such that a person will be rewarded for avoiding it.
Quran	The central religious text of Islam, which Muslims believe to be a revelation from God and transmitted by the Prophet Muhammad (PBUH).
Sunnah	The collection of writings documenting the traditions or known practices of the Prophet Muhammad, many of which have been recorded in the volumes of Hadith literature.
Fatwa	A formal ruling or interpretation on a point of Islamic law given by a qualified legal scholar (known as a mufti).
Hadith	The record of the words, actions, and the silent approval, of the Islamic prophet Muhammad.

Attestation of authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Signature:

Date: 16th March, 2018

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Prelude

This section begins with the motivation for the study and an overview of Jordan and the religion of Islam. With the context of the study explained, the Prelude provides an outline of the structure of the thesis.

Overview of Jordan and the religion of Islam

The participants in the study reported in this thesis were all Jordanian Muslims. Islam, which is the dominant religion in Jordan, is central to this research. Jordan is located in the Eastern Mediterranean Region (EMR) (see Figure 1) with a population of about 9.5 million (47% female; 53% male). Forty-two per cent of the population (4.02 million) is under 18 years of age (Jordan Department of Statistics, 2015).

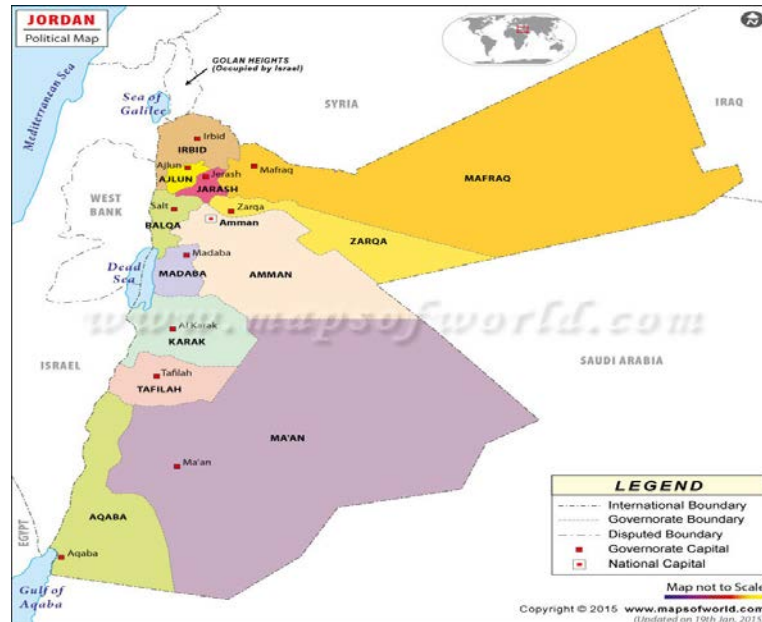


Figure 1. Map of Jordan (Maps of World, 2015)

More than 92% of the population of Jordan are Muslims (International Business Publications, 2013; Jordan Department of Statistics, 2015); 6% are Christians, and the

remaining 2% of the population are mostly of the Bahá'í Faith. Islam is the official religion of the country. In terms of the global population, Islam is the second-largest religion in the world and one of the fastest-growing (Pew Research Center, 2009, 2015). According to the Pew Research Center (2015), the Muslim population will grow by 35% between 2010 and 2050, from 1.6 billion to 2.76 billion. The majority of the world's Muslim population is found in around 50 countries across the Asia-Pacific region and the Middle East and North Africa (MENA). Most of these are classified as developing countries (Pew Research Center, 2009, 2011).

The Islamic religion was revealed to humankind by the Prophet Muhammad (Peace Be upon Him [PBUH]) in Arabia. Muslims (followers of Islam) believe that there is only one God (Allah) (Esposito, 2011; Koenig & Al Shohaib, 2014a). Islam is described as the total submission and surrender to God. It is also described as the observance of teachings and rules that were presented by God through his messenger the Prophet Muhammad (PBUH) (Esposito, 2011).

Pillars and articles of faith in Islam

Islam is supported by Islamic beliefs (articles) and practices (pillars) which are based on the Qur'an and Sunnah (Esposito, 2011; Koenig & Al Shohaib, 2014a; Zarabozo, 2009). Islam is founded on six articles of faith which are the basic truths revealed by the Prophet Muhammad (PBUH) to his people. When the Prophet was once asked about faith he said, "*It is to believe in Allah, His angels, His books, His messengers, the Last Day and to believe in the divine decree, the good and of evil*" (Sunnah.com, n.d.-f). These articles of faith form the cornerstone of Islam and are of great significance to the topic of this study: tobacco smoking among Muslim youth.

A Muslim's life is centred on the five pillars of Islam, and these obligations are the yardsticks around which a Muslim's life revolves. These are lifetime obligations which an individual will always strive to meet (Esposito, 2011). The Prophet Muhammad (PBUH) said, "*Islam is built upon five pillars: testifying that there is none worthy of worship except Allah and that Muhammad is the Messenger of Allah, establishing the prayers, giving the Zakat, fasting the month of Ramadan and pilgrimage to Mecca*" (Sunnah.com, n.d.-f).

Muslims are required to pray five times a day at sunrise, midday, afternoon, sunset, and evening. This pillar of Islam is called *Salat*, and Allah says in the Qur'an, "*Verily, the prayers are enjoined on the believers at stated times*" (Qur'an 4: 103). Another important pillar of Islam is *Swam* – fasting during Ramadan – a requirement in all days the month of Ramadan every year for self-control, including abstaining from eating food, drinking, smoking and gratifying sexual desires from dawn till sunset. Allah says in Qur'an, "*O you who have believed, decreed upon you is fasting as it was decreed upon those before you that you may become righteous*" (Qur'an 2: 183). Daily prayers and the fasting of Ramadan are very relevant to the issue of smoking among Muslims. In these ways Islamic beliefs help followers to live a healthy life by encouraging abstention and materialistic thinking.

Islamic doctrine and tobacco smoking

Islam influences the law and social practice as well as spirituality and hence its teachings have a holistic impact on the lives of its followers (Kabbani, n.d.). According to Islamic doctrine, the minimisation of harm to society and the individual follower is a central goal. A key element of Islamic doctrine in relation to this thesis is that followers are to refrain from any act that will harm either their body or their soul (Chamsi-Pasha & Albar, 2013; Gatrad & Sheikh, 2001; Islamic Relief Worldwide,

2014). This of course is particularly relevant to any study of tobacco smoking among Muslims.

Personal Motivation

I Tariq Nayef Jabor Al-Shatanawi, am a Jordanian Muslim. My interest in smoking among Muslim youth in Jordan was influenced by my professional experience and my life in Jordan. In Jordan and Saudi Arabia, I worked in departments of Internal medicine and Angiography from 2008 to 2013. While working in hospitals, I often saw Jordanian Muslim adults being admitted to the medical ward with lung disease, chronic obstructive pulmonary disease (COPD) and heart disease due to smoking. Through taking their medical history, I found that many had started smoking at an early age.

I started smoking at an early age myself. After a few years of smoking, I attended adult religious lessons that discouraged tobacco use because of its harmful effects on health. I therefore attempted to stop smoking, but I was not successful and did not appreciate the importance of it at that time. After several years, symptoms such as difficulty of breathing and sleeping started to appear. Recently, I have been diagnosed with mild COPD. All these factors have now resulted in my quitting smoking for both religious and medical reasons. In addition I have two young brothers and a sister who are entering adolescence and I am concerned about their initiation in to smoking in the near future. I also have the future of my two infant children to consider.

When I was young, I believed that I could quit smoking at any time, but I became highly dependent on nicotine and became a regular smoker when I entered adulthood. For all these reasons, I felt it was particularly important to focus on smoking among adolescents.

After completing my Master's in Public Health, I came to New Zealand at the end of 2013 to carry out further postgraduate studies and learn more about research. My initial thought was to focus on smoking among adolescents in Jordan and compare

them with students in Western countries like New Zealand in terms of culture, religion and family.

After discussions with my supervisors and recognising that with Islam being the national religion in Jordan, where 92% of the population is Muslim, in comparison with the New Zealand religion and culture, it became apparent that directly comparing Jordan and New Zealand would be very problematic. I therefore changed my focus to the examination of the impact of religion on tobacco smoking during pre-adolescence in Jordan.

To do this, I needed to measure the association between Muslim religiosity and prevalence of cigarette or water pipe smoking, and to see whether religiosity can act as a protective factor in child smoking behaviour. In addition to my personal motivation, this thesis has the support not only of religious leaders but also health professionals and government officials in Jordan. Having explained the context of the study, an overview of the thesis structure now follows.

Structure of the thesis

After this Prelude, Chapter 1 presents an overview of the study, its rationale and its significance. Chapter 2 then reviews the literature about cigarette and waterpipe (WP) smoking internationally, in MENA and Jordan specifically, as well as the relevant literature on the religion of Islam. It also explores the association between smoking and Islam religion and the theories of behavioural change relevant to young children.

Chapter 3 describes the design of the study and the method of data collection adopted.

Chapter 4 then describes the development and validity assessment of a religiosity measurement tool for use with Muslim students aged 9 to 13 in Jordan, which includes testing for internal consistency using Cronbach's α and which was structurally validated using exploratory factor analysis for the religiosity scale. The development of this tool was based on the work of El-Menouar (2014), who proposed a tool based on the work of Glock (1962). Chapter 5 outlines the first baseline study, which administered a questionnaire to school children in public and private primary schools in Irbid, Jordan. This chapter presents the results of the prevalence rates of smoking and the association between religiosity and prevalence of smoking cigarettes and WP among Muslim youth in 2015, followed by discussion of the findings.

Chapter 6 focuses on a follow-up survey conducted 1 year after the initial survey described in Chapter 5 in order to estimate changes in forms of tobacco use, attitudes and children's demographic characteristics from 2015 to 2016, as well as to examine the association between religiosity and prevalence of smoking cigarettes. In the follow-up survey questions were administered to the same students who were surveyed in the first study, in addition to the new students who had joined the target age group. This chapter therefore presents the results in terms of the trends observable from baseline to follow-up. The final chapter discusses the findings of the study as a

whole in relation to the existing literature. The strengths, limitations and major implications of the research are presented along with future recommendations.

Chapter 1 : Introduction

This introductory chapter gives an overview of the study, the rationale, significance, hypotheses and research questions. This study is a pilot repeated cross-sectional survey of the association between religiosity and tobacco use among Muslim students at primary schools in Irbid, Jordan. The study was designed to examine the association between religiosity and prevalence of smoking cigarettes and WP among Muslim youth. Data was obtained to inform the design for the intended full study in the future. However, the intended full study lies outside the scope of the current pilot study. This chapter presents the rationale and significance of current study, aims and research question.

1.1 Rationale

Investigating the association between religiosity and tobacco use among Muslim students at primary schools in Irbid, Jordan is important for many reasons. Firstly, the use of tobacco by the youth remains a major problem and reducing smoking and the burden of diseases that it carries with is one of the priorities of many governments (World Health Organization, 2011c). The awareness levels of the harmful effects of tobacco is increasing on a worldwide scale as well (World Health Organization, 2011c). However even though children are reported as being more aware of the harmful effects, their smoking rates are also increasing at a very fast rate (Giovino, 2002). It is therefore important to advance research to understand this phenomenon.

Secondly, previous research in this general area have demonstrated associations between religion and health behaviour (both positive and negative), as well as religion

and smoking (Garrusi & Nakhaee, 2012; Islam & Johnson, 2003; Koenig et al., 1998). However little work has focused on youth and therefore this study fills that gap.

Thirdly; several studies demonstrate that there is some association between religiosity and tobacco use (Alzyoud, Kheirallah, Ward, Al-Shdayfat, & Alzyoud, 2015; Islam & Johnson, 2003; Koenig et al., 1998; Nor Afiah, Rahmah, Salmiah, Fazilah, & Shamsul, 2012; Yong, Hamann, Borland, Fong, & Omar, 2009). In light of the complex relationship between Islam tenants and tobacco use, it is important to identify what elements of religiosity are critical to this association. This study will also involve developing a modified religiosity scale as will be reported in Chapter 4. The scale is based on the dimensions that were created by Glock (1962) adapted by El-Menouar (2014) for adult Muslims, and further adapted in this research in order to be appropriate for Muslim youth. This is the first occasion to develop a measurement tool for religiosity in Muslim school children.

1.2 Significance

The international literature as summarised in the next chapter, demonstrates the negative impact of tobacco smoking on the younger generation and flow on effects to the country as a whole. In addition, there is some evidence of an association between religious practice in Islam and smoking, with increased commitment in the former associated with decreased prevalence in the latter (Alzyoud et al., 2015). At face value, it will be difficult to directly translate any such association into an intervention. However, there may be scope to use this association in an educational intervention if two conditions are fulfilled: 1) some clearer evidence of association between increased religiosity and decreased smoking prevalence is produced, and 2) the associations between the several dimensions of religiosity and smoking are evaluated more

specifically. This definitive study would address these two conditions and is described in Section 7.8. The current pilot study was designed to prepare the way for this definitive study. This is the first study to examine these associations between religiosity and prevalence of smoking cigarettes and WP using a modified multidimensional religiosity scale for Muslim school children in Islamic societies.

1.3 Objectives, research question and hypothesis

The current study aimed to achieve three objectives: 1) Assess the association between religiosity and tobacco use (prevalence) among primary Muslim school students in Jordan. 2) Develop and test a new measure of religiosity for Muslim school students. 3) Obtain data to inform the design for the intended full study.

The study seeks to answer the following research question:

Q: What is the relationship between religiosity and prevalence of cigarette and WP smoking in Muslim school children in Jordan?

The current pilot study is intended to address the following hypotheses in a population of Muslim school children as summarised in Table 1. The religiosity dimensions presented in Table 1 were developed as part of this research and are introduced in Chapter 4.

Table 1. *Study hypotheses*

An increase in	Will be associated with	of
1. Strength of religious Belief		i. Cigarette smoking
2. Strength of religious Devotion & Practise		
3. Strength of religious Knowledge	Lower prevalence	ii. WP smoking
4. Strength of religious Orthopraxis & Experience		

Chapter 2 : Literature review

2.1 Introduction

This chapter reviews the relevant literature on tobacco use among young people in Muslim countries, including its relationship with the religion of Islam because religiosity is a major focus of this research. The purpose of doing this review is therefore to discuss what is currently known about tobacco use globally and in selected countries, and to identify gaps in the literature about issues related to tobacco use and religiosity among young people, especially in Muslim countries.

The review begins with definitions relating to forms of tobacco use and summarises the evidence for the public health impacts of smoking in terms of preventable morbidity and premature mortality. The next sections describe in more detail tobacco use trends in developing countries, in particular in the Middle East and Jordan, and explores the issues relating to youth and why they are of concern. Theoretical frameworks are also explored as possible ways of understanding these issues. Finally, this chapter discusses the concepts of religiosity and tobacco use, and how they are interrelated.

2.2 Tobacco use

2.2.1 Definitions and forms of tobacco use

Before delving into forms of tobacco use, it is important to define what smoking entails. “Smoking” in this thesis refers to the action of lighting a cigarette (see Figure 2), WP or any other object made from tobacco or materials with similar effects and inhaling the smoke, which is taken into the chest and then exhaled from the nose and mouth.



Figure 2. *A lighted cigarette (Jordan General Iftaa' Department, 2006).*

Although most of the tobacco that is consumed throughout the world is in the form of manufactured cigarettes, it is also smoked in other forms, such as WP (Saunders & Geletko, 2011; World Health Organization, 2008a). The use of WP has become epidemic in the EMR and there are fears that this will spread outside these countries and rapidly become a global phenomenon (Abu-Rmeileh et al., 2018; Jawad, Lee, & Millett, 2015; Maziak et al., 2014; T. Singh, 2016). The WP is a device used with charcoal-heated tobacco, the smoke of which is inhaled through a water filter (Grekin & Ayna, 2012). WP is known by different names in different countries: hookah, shisha, and hubble-bubble; in Jordan it is called narghile or arghile (Alzyoud,

Weglicki, Kheirallah, Haddad, & Alhawamdeh, 2013; Maziak, Ward, Soweid, & Eissenberg, 2004).

In terms of physical structure, a WP consists of a head, body, water bowl, and a hose (see Figure 3). The head is made of clay with holes at the bottom and the tobacco is loaded into it. Charcoal is used to heat the tobacco (Martinasek, McDermott, & Martini, 2011). The most common type WP tobacco is *maassel*, which is usually sourced from Bahrain and Egypt (Maziak, Fouad, et al., 2004; Shihadeh, 2003). The tobacco is usually sweetened and comes in flavours such as apple, grape, mint, or chocolate (Martinasek et al., 2011). It is presumed that such flavours are a factor in the increased spread of WP tobacco smoking (Rastam, Ward, Eissenberg, & Maziak, 2004), especially among youth in general and young girls in particular (Akl, Jawad, Lam, Obeid, & Irani, 2013; Al Mutairi, Shihab-Eldeen, Mojiminiyi, & Anwar, 2006; Alzyoud et al., 2013).

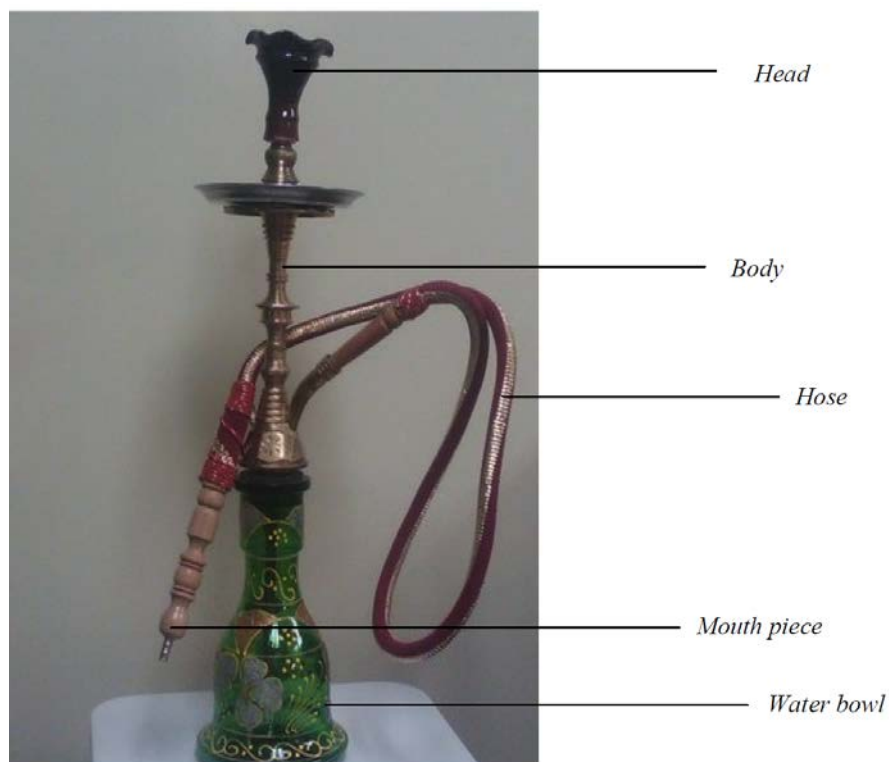


Figure 3. WP components (Acharya, 2012,P 18)

2.2.2 International tobacco consumption trends

Tobacco smoking is a worldwide epidemic and is an issue in both developed and developing countries, attracting concern from both health systems and international bodies. A 2014 study found that across 187 countries for the period 1980–2012 the estimated age-standardised prevalence of daily tobacco smoking in those older than 15 years declined among men from 41.2% in 1980 to 31.1% in 2012 and among woman from 10.6% to 6.2%. Despite the declines in prevalence of daily smoking, however, the numbers of daily smokers increased from 721 million in 1980 to 967 million in 2012 (Ng, Freeman, Fleming, & et al., 2014).

Globally the death toll (annual deaths) attributed to tobacco is estimated to be about 5 million (Rentería, Jha, Forman, & Soerjomataram, 2015), and in terms of numbers of smokers, World Health Organization (2008c) estimates more than 1.1 billion smokers worldwide, and more than 80% of these live in low- and middle-income economies.

Tobacco manufacturing spread worldwide during the 20th century (O'Connor, Wilkins, Caruso, Cummings, & Kozlowski, 2010). The growth in the number of smokers has led World Health Organization (WHO) (World Health Organization, 2011c) to warn that if trends continue the number of deaths will increase to more than 8 million people per year worldwide by the year 2030 (Abubakar, Tillmann, & Banerjee, 2015; Mathers & Loncar, 2006; World Health Organization, 2009), 80% of which will occur in low- and middle-income countries (World Health Organization, 2009, 2011d).

There is also a concern with regard to the unequal burden of this epidemic. For example, in most developed societies successful policies and interventions on tobacco use have led to the decline in smoking trends among adults over the past 30 years (Centers for Disease Control and Prevention, 2007; Van der Wilk & Jansen, 2005).

But while tobacco use has declined in many high-income countries such as the United States (T. Singh, 2016) and in New Zealand (Ball, Stanley, Wilson, Blakely, & Edwards, 2016), it is increasing at alarming rates in many low- and middle-income countries (Boutayeb, 2006; Kheirallah et al., 2016; Shafey, 2007; Warren, Jones, Eriksen, Asma, & group, 2006), including Jordan (Belbeisi, Al Nsour, Batieha, Brown, & Walke, 2009; Centers for Disease Control and Prevention, 2010), especially among adolescents (Akl et al., 2011; Maziak et al., 2013).

Furthermore, between the years 2005 and 2016, the share of global cigarette sales in Western Europe declined from 12% to 9%. On the other hand, the share of global sales increased from 7% to 9% in the MENA (Euromonitor International, 2011, 2017). The declining smoking trend in the developed world has been attributed to people becoming more health conscious, which in turn has pushed tobacco industries to target developing countries with their products.

There is evidence that tobacco use is a direct cause of preventable morbidity and premature mortality (Jha & Zatonski, 2005): coronary artery disease, stroke, and lung disease. In younger people the risks of these diseases increases. For example, it has also been found that younger smokers tend to have a greater risk of cancer, respiratory infections and coughs, and cardiovascular risks (Higgins & Conner, 2003; Royal College of Physicians, 1992). Despite such threats to life, it is argued that nicotine, which is highly addictive, is the cause of having many people continue to smoke (Roskin & Aveyard, 2009; Tavafian, Aghamolaei, & Zare, 2009). In 2011, figures from the WHO indicated that the top preventable cause of morbidity and mortality is tobacco smoking, killing nearly 6 million each year (Mathers & Loncar, 2006; Rentería et al., 2015; World Health Organization, 2011a). One study demonstrated that in 23 countries with 80% of the burden of chronic disease related to smoking in

low- and middle-income regions of the world, 5.5 million deaths could have been averted by the implementation of four elements of the WHO FCTC over 10 years from 2006 to 2015 (Asaria, Chisholm, Mathers, Ezzati, & Beaglehole, 2007).

2.2.3 WP smoking trends

Water pipe (WP), a traditional method of smoking tobacco products, is an old tobacco smoking practice closely tied to culture; it is predominantly found in the EMR in countries such as Lebanon, Jordan, Kuwait, Egypt, Syria and Iraq (Chaouachi, 2007; Martinasek et al., 2011; Shihadeh, Azar, Antonios, & Haddad, 2004). WP smoking is now at epidemic levels in many Asian and African countries, and is also spreading to North America and several European countries (Chan, Leatherdale, Burkhalter, & Ahmed, 2011; Sterling & Mermelstein, 2011). A recent survey of students in 152 US universities found that 31% had used WP once and that 8% currently used it, making it second in popularity after cigarettes (Akl et al., 2011; Primack et al., 2012). Furthermore, a systematic review published in 2011 reported the prevalence of WP smoking among school students in the United States (12%–15%); the Arabic Gulf region (9%–16%); Estonia (21%); and Lebanon (25%), which Jordan neighbours (Akl et al., 2011). Even in terms of annual trends, the rates of this type of tobacco smoking have increased in the past decade among younger people, including school-age groups (Akl et al., 2011; Sibai et al., 2014). While global figures show that cigarette use is either declining or steady in many parts of the world, the use of other forms of tobacco, particularly WP, is increasing (Maziak et al., 2014).

In the Middle East and North America trends are changing towards the adoption of WP as a replacement for cigarettes (Maziak, 2013). For example, in the United States between 2011 and 2015 WP smoking increased among high school students from 4.1% to 7.2%. It has been argued that an important factor contributing to the growing

use of WP smoking by this group is parent and family member use (T. Singh, 2016). A study conducted among a convenience sample of Arab-American high school students found that if one or more parents or family members smoked WP at home, adolescents were 6.3 times more likely to be current WP smokers (Weglicki, Templin, Rice, Jamil, & Hammad, 2008). Additionally, studies in the MENA region have indicated that the likelihood of adolescents smoking is increased if they had a parent who smokes WP or cigarettes (Al-Lawati, Muula, Hilmi, & Rudatsikira, 2008; Bejjani, El Bcheraoui, & Adib, 2012).

WP smoking mostly is a social activity happening mainly in gatherings of family and friends at home (Abughosh, Yang, et al., 2012; Azab et al., 2010; Dar-Odeh et al., 2010). Restaurants and cafés are also settings where WP smoking can occur readily (Al Moamary et al., 2012; Azab et al., 2010; Dar-Odeh et al., 2013; Smith et al., 2011; Sutfin et al., 2011).

In Middle Eastern countries tobacco use by women and girls has historically been very low (Centers for Disease Control and Prevention, 2010; Maziak, Asfar, & Mock, 2003), but there is concern that WP use is growing among adolescent and young adult females, for whom WP is less stigmatised than cigarettes (Maziak, Ward, et al., 2004). This, therefore, leads to a situation where youth in general, and young girls in particular, are more susceptible to WP smoking compared to other forms of smoking such as cigarettes. This is presumed to be due to its taste, growing social acceptance, and the misconception that it is safer than smoking cigarettes (Akl et al., 2011; Al Mutairi et al., 2006; Maziak, 2014). The growing availability of tasty and easy to use tobaccos known as maassel is a factor too (El-Hakim & Uthman, 1999). These factors, together with misconceptions, eventually result in addiction, not to mention the other issues of early initiation and prolonged maintenance (Maziak et al., 2014).

Furthermore, WP smoking is considered “traditional” in many Arab societies and is more culturally acceptable than cigarettes (Akl et al., 2015).

Because WP smoking is more socially acceptable than cigarettes for girls, this form of tobacco use is increasingly serving to initiate girls into tobacco use (Akl et al., 2011; Maziak et al., 2014) and indirectly contributing to increased susceptibility (Jaber et al., 2015; Kheirallah, Alzyoud, & Ward, 2015).

A recent cross-country systematic review of WP smoking prevalence studies across different age groups found the countries that had the highest number of school students using WP were in the United States, the Arabic Gulf region, Estonia, and Lebanon (Akl et al., 2011). Indeed, other studies have reported worrying levels of WP smoking among adolescents which ranged from 6% to 34% in the EMR (Warren, Lea, et al., 2009) and from 5% to 17% among American adolescents (Maziak, 2011). Within the US statistics, it is possible that the EMR adolescent population is included because this region has nearly 3.7 million Arab Americans (Arab American Institute Foundation, 2014). In Western societies, recent systematic reviews show that the main motives for WP tobacco smoking include socialising, relaxation, pleasure and entertainment. Peer pressure, fashion and curiosity were seen to be additional motives for university and school students (Akl et al., 2013).

The other issue concerning WP smoking is that the nicotine content (Aboaziza & Eissenberg, 2015; Shihadeh et al., 2004) which leads to dependence and exposes smokers to toxins and hence cardiovascular risks (Maziak, 2013). The ensuing issue of nicotine dependence (Aboaziza & Eissenberg, 2015) also leads to a potential shift into cigarettes and other substance abuse (Jaber et al., 2015; Kheirallah et al., 2015), and thus further risks to the respiratory system, the cardiovascular system and oral

health; higher incidence rates of chronic obstructive pulmonary disease; and many more issues (Akl et al., 2010; El-Zaatari, Chami, & Zaatari, 2015; Maziak, 2013). Recently a case-control study in Iran running from 2013 to 2015 found that having ever smoked WP was associated with multiple sclerosis risk (Abdollahpour et al., 2017).

Indeed several researchers have found that WP smoking can be a factor in subsequent cigarette smoking (Jensen, Cortes, Engholm, Kremers, & Gislum, 2010; Kheirallah et al., 2015; Mzayek et al., 2012). Despite the fact that WP smoking is seen as being less harmful than cigarettes, it has been found to contain more harmful agents and has similar properties as cigarettes that lead to addiction (Bacha, Salameh, & Waked, 2007; El-Nachef & Hammond, 2008; Neergaard, Singh, Job, & Montgomery, 2007; Shihadeh, 2003). Furthermore, WP smoking has been found to be associated with some infectious diseases, low-birth-weight infants, and use of psychoactive substances (Eissenberg, Ward, Smith-Simone, & Maziak, 2008; Prignot, Sasco, Poulet, Gupta, & Aditama, 2008; Tamim et al., 2007). Other specific health concerns about WP smoking include the nicotine plasma concentration. It has been estimated that smoking tobacco from a WP once each day results in the plasma nicotine concentration of someone who smokes 10 cigarettes daily (Shafagoj, Mohammed, & Hadidi, 2002). Furthermore, a single WP tobacco smoking session may involve inhalation of 50–100 times the smoke volume inhaled with a single cigarette (Eissenberg & Shihadeh, 2009). Furthermore, one systematic review found that the adverse effects of WP smoking on lung function are similar to those of cigarette smoking (Raad et al., 2011). A recent report by U.S. Department of Health and Human Services (2014) indicated that tobacco use and exposure to second-hand smoke are linked to a large number of severe health conditions such as cancers, cardiovascular disease, and chronic

respiratory system diseases. There is some evidence too that nicotine exposure may interfere with healthy brain development (Dwyer, McQuown, & Leslie, 2009; Galván, Poldrack, Baker, McGlennen, & London, 2011).

2.3 Prevalence of cigarette and WP smoking in Arab countries

As has been noted above, in addition to the increasing rates of WP use globally, the Arab world has the highest rates. Smoking prevalence among adolescents in the Middle East remains high. This is despite the fact that rates of smoking have been going down among adolescents in other parts of the world (Maziak, 2013). The dramatic popularity of WP smoking among youth may be an indication that it has or is about to replace cigarettes in terms of popularity (see Figure 4) (Akl et al., 2011; El-Awa, Warren, & Jones, 2010; Hipple, Lando, Klein, & Winickoff, 2011; Maziak, 2011, 2013). For example, a recent study in Jordan among adolescents in grades 7–10 found that about 21% reported only smoking WP and 7% only smoking cigarettes (Alomari & Al-sheyab, 2017).

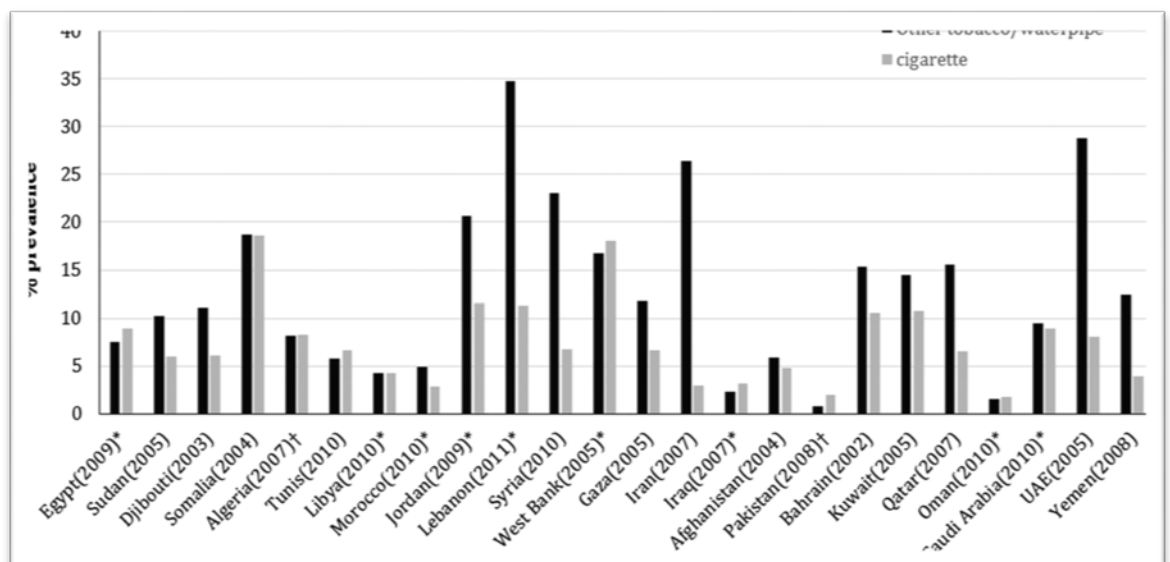


Figure 4. Other tobacco/WP vs cigarette smoking among 13–15 year-olds in selected countries (Maziak, 2011)

Studies have also found that over 55% of Jordanian university students had ever smoked WP and over 30% smoked WP at least monthly (Azab et al., 2010; Khabour et al., 2012). Another study found that percentages of high school students aged 13–15 who were current WP smokers in Middle Eastern countries were: Lebanon (36.9%), the West Bank (32.7%), Syria (20%), Jordan (19%), Kuwait (15%), Saudi Arabia (10.2%), United Arab Emirates (9.5%) and Egypt (8.5%) (Jawad et al., 2015). In contrast, 8.4% of university students and 5.2% of high school students in the United States were current WP smokers (Arrazola et al., 2014; Primack et al., 2012). The prevalence of cigarette smoking in the EMR countries among students aged 13–15 was the highest in West Bank (21%), Kuwait (17%), Lebanon (14%), Jordan (11%), Saudi Arabia (10.4%), Syria (20%), Jordan (19%), Saudi Arabia (10.2%), Egypt (9.5%) and United Arab Emirates (9.4%) (Jawad et al., 2015).

The appearance of flavoured WP has increased its appeal to youth in café settings, and its increasing presence on social media has been noted (Akl et al., 2013; Maziak, 2008). Although customary among men, the practice of WP smoking has more recently spread to women and youth in the EMR (Salameh, Waked, & Aoun, 2008).

Data from 17 Arab countries obtained by the Global Youth Tobacco Survey (GYTS) from 2005 to 2011 are relied on due to the survey's comprehensiveness in capturing the prevalence rates of cigarette and WP smoking. For the overall period 2005–2011, 3.0% of youth were cigarette smokers only, and 6.1% were WP smokers only (Kheirallah et al., 2016). Estimates of the higher prevalence of cigarette smoking only among boys compared to girls were reported (5.1% vs 1.1%); with the corresponding figures for WP smoking being 7.4% vs 4.6%. As for country-specific data, the highest cigarette smoking only estimate among girls was in Jordan (2.9%); the highest WP smoking only estimate among girls in Lebanon (25.1%); the highest cigarette smoking

estimate among boys was in Kuwait (10.5%); and the highest WP smoking only estimate among boys was United Arab Emirates (10.2%). Overall, in all countries the prevalence estimates of cigarette smoking only were higher among boys than girls. In contrast, the WP smoking only estimates were higher among girls than boys in the West Bank, Lebanon and Kuwait. The prevalence estimates of tobacco use significantly increased with increasing age in both sexes ($p < 0.0001$) (Kheirallah et al., 2016).

2.4 Tobacco use and health effects in Jordan

Although there are regulatory measures such as a ban on smoking in public places, cafés, government offices, and more recently in restaurants, smoking in Jordan is still a serious problem affecting almost all community layers (Shadid & Hossain, 2015). This issue is not limited to Jordan but extends to neighbouring countries too, which have some of the highest tobacco smoking rates in the world. Another issue of concern is that there are forecasts of further increases in use over the next few years (Haddad et al., 2011; Maziak et al., 2013). Jordan became a party to the WHO Framework Convention on Tobacco Control (FCTC) on February 27, 2005 (Tobacco Control Laws, n.d.). According to the law in Jordan, smoking is prohibited in public places, which include hospitals, healthcare centres, schools, cinemas, theatres, libraries, museums, public and non-governmental buildings, public transport vehicles, airports, closed playgrounds, lecture halls and any other location to be determined by the health minister. However, the law is poorly enforced in some places. Any person caught smoking in a public place is subject to between one week and one month imprisonment or a JD15-JD25 fine. The same penalties apply to those who sell cigarettes to minors (The Jordan Times, 2015). Almost all forms of tobacco advertising and promotion are prohibited and health warnings have been authorized for cigarette packs only

(Tobacco Control Laws, n.d.). Although the law bans selling tobacco to those under the age of 18, shop owners seldom abide by this law (The National, 2014).

In terms of trends, the GYTS survey's Jordanian data shows that current cigarette smoking among youth aged 13–15 declined from 17.7% in 2003 to 10.3% in 2007. On the other hand, other tobacco use increased from 11.2% in 1999 to 26.4% in 2007 (Centers for Disease Control and Prevention, 2010). The decline in other tobacco use from 2007 to 2009 and the decline in cigarettes from 2003 to 2009 might be because WP smoking is becoming more popular among youth and replacing cigarettes. In 2010, the GYTS reported the prevalence of WP smoking in Jordan for the period 1999–2009 (see Figure 5).

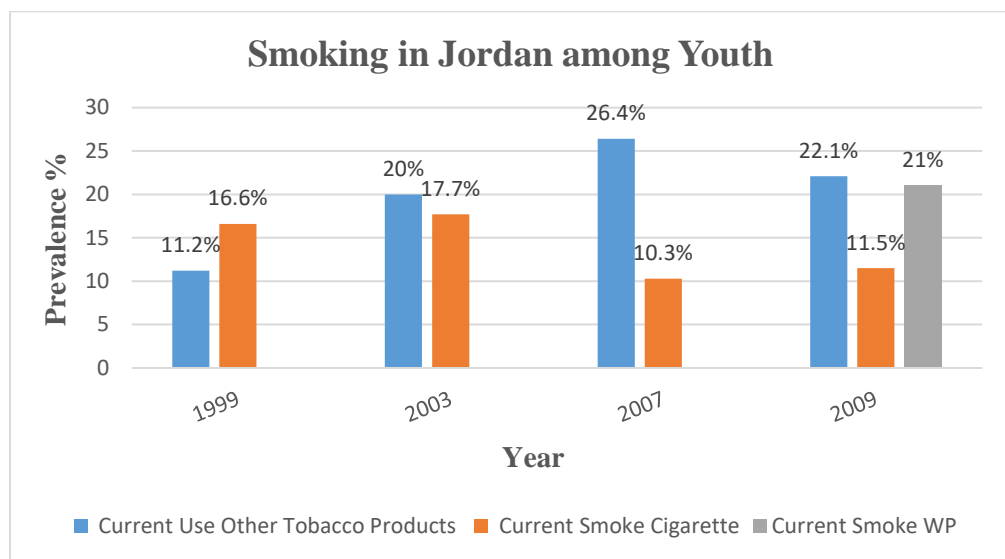


Figure 5. *Smoking among youth aged 13–15 in Jordan (CDC, 2010)*

Another survey by the Jordanian Ministry of Health found that smoking increased from 27% to 29% among Jordanians over the period 2005–2007 (Dar-Odeh et al., 2010; World Health Organization, 2008b).

The prevalence rates also differ by age groups. For example, the prevalence rates were high in particular age groups stratified by sex. The prevalence overall of current

smokers among adults (aged >18 years) was estimated at 32% of participants (55% among males and 8% among females). About 57% of males and 4% of females aged 18–29 reported being current smokers (Jaghbir, Shreif, & Ahram, 2014). Another study of students age 16–18 years from Amman schools in Jordan reported the prevalence of those who had ever smoked to be at 43%, while 28% were current smokers (Shadid & Hossain, 2015).

Compared to international rates, male smokers greatly outnumber female smokers in Jordan. For example, a report by WHO in 2002 indicated that 48% of males and 10% of females in Jordan were smokers, whereas in the United States 25.7% of males and 21.5% of females were smokers (Khallad, 2010).

Importantly, in regard to issues specific to Jordan, the detrimental health effects of tobacco use in this country have been identified (Al-Nsour et al., 2012; Jaghbir et al., 2014). Smoking-related diseases in Jordan are on the rise. The epidemic and disease burden caused by tobacco use is alarming in the country (Centers for Disease Control and Prevention, 2003, 2006; Nsour, Mahfoud, Kanaan, & Balbeissi, 2008). Chronic lifestyle diseases accounted for 50% of all deaths in Jordan and money spent on tobacco products is estimated to be 250 million Jordanian dinar (JOD), annually (Belbeisi et al., 2009). Also, cardiovascular disease is the leading cause of mortality in Jordan (36.1%), followed by cancer (15.6%), rates of which have been observed to be rising recently (Jaghbir et al., 2014). Indeed, the number of diagnosed new cancer cases has increased by 46% in the past 10 years, from 3,362 cases in the year 2000 to 4,921 in 2010. With regard to mortality due to cancer, that the most common cause of death is due to malignant neoplasms (15%) (Jordan Ministry of Health, 2009). Among Jordanian males the top five cancer types were colorectal (14.2%), lung (13.3%), prostate (9.4%), urinary bladder (8%) and leukaemia (5.5%), while among Jordanian

females the top five cancers were breast (37.4%), colorectal (9%), thyroid (5.4%), non-Hodgkin's lymphoma (5.2%) and uterus (3.6%) (Ministry of Health & Jordan Cancer Registry, 2010).

2.4.1 Cigarettes smoking in Jordan

The prevalence of cigarette smoking in Jordan is high compared to neighbouring countries in the EMR (see Figure 6). It is especially among males, and the GYTS estimates that the prevalence of current cigarette smoking among 13–15 year-olds increased from 10.3% to 11.5% between 2007 and 2009 (Centers for Disease Control and Prevention, 2010).

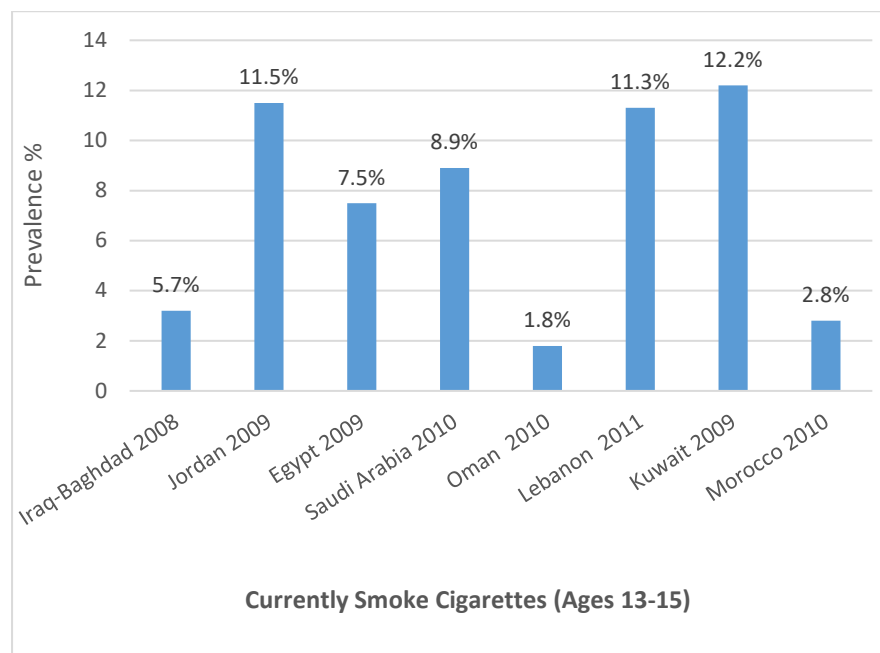


Figure 6. Cigarette smoking among 13–15 year olds in the EMR according to GYTS (CDC, 2010).

In terms of initiation, it has been found that 30% of Jordanian youth had begun cigarette smoking by 10th grade (Karma McKelvey et al., 2014). The frequency of youth smoking appears to be increasing, with 38.3% of students increasing the frequency of their cigarette smoking during the 3 years of a longitudinal study, from 2008 to 2011, in Irbid, Jordan (Jaber et al., 2015).

In terms of the prevalence of those who had ever smoked a cigarette, the figures were 35.6% among male adolescents (n=815) (aged 8–14 years); 49.1% for 11–12 year

olds; and 25.3% for 10 year olds (25.3%) (Al-Sheyab, Alomari, Shah, Gallagher, & Gallagher, 2014).

In terms for adult cigarette smokers in Jordan, a cross-sectional study was conducted among adults 18 years or older (n=600) and found that 45% of the population had smoked a cigarette in the past month, 40% in the past week, and 36% in past 24 hours. The results showed that males were significantly more likely to smoke cigarettes compared with females (Abughosh, Wu, et al., 2012). Another study among Jordanian university students (n=1845) showed that cigarette smoking rates were 29% in the past 30 days and 57% for those who had ever smoked (Khabour et al., 2012).

A recent study among the Jordanian adult population aged 18–79 (n=869) found that the overall prevalence of cigarette smoking was 59.1% among males and 23.3% among females (Abu-Helalah, Alshraideh, Al-Serhan, Nesheiwat, & Al-Nawafleh, 2015). Comparing the poorest and the richest Jordanians, one study found that, among of 804 adult smokers, the poorest 40% of adult males were 1.7 times more likely to smoke cigarettes than the richest 17% of adult males (Toukan, 2016).

2.4.2 WP smoking in Jordan

In Jordan, WP smoking is usually known as *narghile* or *arghile* (Alzyoud et al., 2013). Recently WP smoking has gained in popularity in Jordan, primarily among adolescents (Karma McKelvey et al., 2013; Mzayek et al., 2012) and has surpassed cigarette smoking (Alzyoud et al., 2014; Khabour et al., 2012; Mzayek, Khader, Eissenberg, Ward, & Maziak, 2011). Now WP smoking is almost as common as cigarette smoking among adolescents (Al-Sheyab et al., 2014; Alomari & Al-sheyab, 2017; Alzyoud et al., 2013) and university students in Jordan.

While cigarette smoking is consistently associated with high socioeconomic status, WP smoking is more evenly distributed across various populations (Khabour et al., 2012). Among current WP smokers in Jordan, 37.8% of boys and 24.6% of girls started WP smoking before the age of 10 (Mzayek et al., 2011).

WP smoking (30.2%) was more prevalent than cigarette smoking (18.4%) at an early age among 1,781 students aged 11–15 and led to the initiation of cigarette smoking (Jaber et al., 2015). In 2009 about 21% of Jordanian adolescents were regularly smoking WP, with higher prevalence rates among males (27.1%) than females (15.6%) (Centers for Disease Control and Prevention, 2010).

A cross sectional study, was conducted among school students aged 11–18 in Jordan to investigate the patterns and predictors of WP tobacco use. The results indicate that the numbers of those smoking WP ranged from 30% for once the past week, 34% for the past month, and 36% for the past year. WP smoking was found to be more prevalent among girls than boys (Alzyoud et al., 2013).

In terms of the prevalence for adults smoking WP in Jordan, a cross-sectional study that was conducted among participants aged 18–79 showed that 19% of males and

23% of females smoked WP (Abu-Helalah et al., 2015). Studies among Jordanian university students have found that WP smoking is highly prevalent: 56%–61% of participants' reported ever using WP and 30%–43% reported using in the past 30 days (Azab et al., 2010; Khabour et al., 2012). Alarmingly, among women aged 15–49 the average rate of WP use doubled from 5.5% in 2009 to 10.3% in 2012 (Department of Statistics & ICF Macro, 2010; Jordan Department of Statistics & ICF International, 2013).

The growing number of WP cafés in Jordan and the lowering of tobacco prices are possible causes of these trends (Whitman, 2013). WP smoking using flavoured tobacco shared among a group of people in a café is common, and this environment counters health promotion efforts. This is because children not yet of legal age can easily gain access to tobacco using this avenue. These cafés provide a venue for smoking, which is legal, and children perceive smoking WP smoking as safe, or less harmful, than cigarettes (Holtzman, Babinski, & Merlo, 2013).

2.4.3 Youth smoking prevalence in Jordan

In many developing countries, including Jordan, tobacco smoking is increasing among youth (Kheirallah et al., 2016; Lee, Ling, & Glantz, 2012; Karma McKelvey et al., 2013; Warren et al., 2008). It is the growth of smoking in Jordanian adolescents that is most concerning. Research about youth smoking in Jordan has been carried out via several surveys, however the results demonstrate a lot of variation in prevalence rates. Such studies tend to target 8–18 year-olds and reveal worrying prevalence rates and ages at which youth start smoking (Alzyoud et al., 2013). One study of male adolescents in Jordan found that the age of starting to smoke for most was 12 (74.4%). However, this study also showed that more than 25% of participants had begun at 10 years of age (Al-Sheyab et al., 2014).

The estimated prevalence of current use of any form of tobacco among adolescents aged 13–15 in Jordan was 22.9% in 1999; 19.9% in 2004; 24.9% in 2007 (Belbeisi et al., 2009); and 26.1% in 2009, when about 21% adolescents currently smoked WP, with higher prevalence rates among males (27%) than females (16%) (Centers for Disease Control and Prevention, 2010).

Furthermore, the GYTS data for the period 2005–2011 among adolescents aged 13–15 years in Jordan shows that the prevalence estimates of cigarette smoking only are 6.6% vs 2.9% for boys and girls, respectively. The estimates for WP smoking only were 14.9% vs 10.9% for boys and girls, respectively (Kheirallah et al., 2016).

Mzayek et al. (2012) followed a sample of adolescents in Irbid, Jordan (N=1702) from the 7th to the 9th grade found the prevalence of those who had ever smoked and those who were currently smoking cigarettes and WP increased during the 2-year follow-up period (2008–2010). For example, the rate of those who had ever smoked cigarettes increased 2.5 times from 18% to 45%. Those who had ever smoked WP increased 1.8 times from 26% to 46% during the same period. Both ever and current WP use were more prevalent than cigarette use and boys were higher than girls at both time points. For example, those who had ever smoked cigarettes increased from 26% to 52% among boys (n=869) and from 8.8% to 26% among girls (n=832); those who had ever smoked WP increased from 34% to 57% for boys and from 17.4% to 36% among girls (Mzayek et al., 2012).

Another longitudinal cohort study of adolescents followed students from the 7th to the 10th grade (aged 8–15) between 2008 and 2011 in Irbid, Jordan (N=1,781). This study found that current cigarette smoking prevalence estimates increased among boys and girls, from 8% and 2.3% in 2008 to 25.4% and 7.5%, in 2011, respectively. Current

WP smoking prevalence rates estimates increased among boys and girls from 20.6% and 7.7%, in 2008, to 35.5% and 18.2%, in 2011, respectively (Karma McKelvey et al., 2013).

Another cross-sectional study was conducted in Zarqa city, Jordan, in 2012 among 933 of middle and high school students (aged 11–18 years). Results indicated that about 36% (n=355) of the students were smokers (cigarettes or WP), with 2.6% smoking only cigarettes, 7% smoking WP only, and 26.1% being dual users of both cigarettes and WP (Alzyoud et al., 2014). Dual smoking seems to be a new trend and this is concerning.

In terms of prevalence, it has been found that the prevalence of cigarette smoking was significantly higher among girls (35.1%) than boys (14.7%) and the prevalence of WP smoking was significantly higher among girls (36.7%) than boys (17.8%). These results were from a cross-sectional survey among 950 Muslim students aged 11–18 in Jordan (Alzyoud et al., 2015).

Another recent study conducted in Jordan among adolescents (N=2,407) in grades 7–10 found that 58% of the students were smokers of tobacco. The percentages for WP only, cigarettes only, and dual smoking were 21%, 7% and 30%, respectively. Furthermore, the results also showed that the rate of cigarette smoking (ever) was 5.5% for boys and 3.9% for girls, and the rate of WP smoking (ever) was 8.3% for boys and 10.7% for girls. For cigarette smoking (current), the rate was 2.4% vs 1.6%, and for WP smoking (current) 10.9% vs 11.9%, respectively. (Alomari & Al-sheyab, 2017).

2.5 Theoretical explanations of tobacco smoking habits among youths

Theoretical explanations of tobacco use can be explored in order to find answers for the increase in tobacco smoking rates in the EMR among adolescents. Tobacco use and addiction most often begin during youth and young adulthood (U.S. Department of Health and Human Services, 2014). Internationally, the awareness level of the harmful effects of tobacco is increasing among this age group. There is also a concern that smoking rates of youth are increasing rapidly, even though youth are aware of the harmful effects of smoking (Mzayek et al., 2011). A further concern is that adolescents overestimate the ease with which they can give up smoking, as they believe that once they start smoking they can quit any time they want (Mzayek et al., 2011).

Researchers have also identified that adolescence is a crucial period because this is the time when efforts can be made to make sure that the initiation of smoking is prevented or at least delayed.

The perceptions of adolescents may be very different from those of adults (Kaya & Unalan, 2010), and therefore the current research features a self-report questionnaire aimed at identifying and understanding factors that are associated with such risky behaviours, and how religiosity of students and their families is associated with risky behaviours. The data gathered will provide important information about personal, family, religious and social factors that may hinder or enable smoking behaviours. Such information may be useful in targeting health promotion messages. The complexity of the environments in which youth tobacco smoking behaviours occur in homes, schools, and communities also calls for theoretical understanding of youth smoking behaviours (Lovato et al., 2013). It is therefore important to use not only current data on smoking but also theories that seek to explain how youth behaviour is

shaped. The following section therefore focuses on theoretical explanations of tobacco smoking habits.

2.5.1 Relevant theories

Various theories provide a framework for understanding the social processes that play a role in adolescents' decisions to initiate, persist in or quit smoking. These include social learning theory (Akers & Lee, 1996; Bandura & McClelland, 1977), social cognitive theory (SCT) (Bandura, 1986; Kouloumenta, Zetou, Kosmidou, & Theodorakis, 2009), the theory of planned behaviour (Ajzen & Fishbein, 1980; Record, 2017), problem behaviour theory (Banerjee & Greene, 2008; Jessor & Jessor, 1977), and Bronfenbrenner's ecological theory (Bronfenbrenner, 1981; Ennett et al., 2010; Leonard, 2011).

The above theories do not fully explain all variables in smoking behaviours, however. There are other factors that have been found to predict smoking. Religion is another factor that is often an important part of a child's social environment (Jawad et al., 2015). Previous research in this general area have demonstrated associations between religion and health behaviour (both positive and negative), including smoking (Garrusi & Nakhaee, 2012; Koenig et al., 1998).

After reviewing the available literature about theories that can explain human behaviours, we found social cognitive theory and ecological theory are most relevant to the present research and therefore will be used in this work as a theoretical framework. These two theories as most comprehensive and can accurately interpret the complexity of the tobacco smoking behaviour and surrounding factors among youth in a Muslim society. The rationale for this selection is that together these

theories acknowledge genetic factors and environmental factors, as well as the interaction of these factors.

Social cognitive theory (SCT) can be seen as an expanded kind of the social learning theory. Bandura (1963) proposed that learning can occur due to the observation of others. Children are influenced by the actions of individuals in the society as they observe various individuals. He considered these individuals such as parents, teachers, friends, etc. as models. The child not only observes but also imitates these actions. Youth are viewed as being most likely to imitate the smoking or non-smoking behaviour of those with whom they spend more time with, both in frequency and duration (Akers, 1998; Bandura & McClelland, 1977). Youth with more than one smoking parent were more likely to initiate smoking than youth with two parents who had quit smoking (Chassin, Presson, Rose, Sherman, & Prost, 2002). The SCT has its roots in social learning theory. In this sense, the social cognitive theory is a much-expanded theory that captures a variety of dimensions. An example of the application of this theory is a study of 413 first-year high school students in Greece that aimed to examine smoking behaviour through the relation of this theory with parents' influence on adolescents' smoking behaviour. It was found that that intention to smoke was predicted by the attitudes of children towards smoking. Self-identity, experimentation with smoking, and the attitudes of parents towards smoking were seen as pivotal factors in the behaviours. This study therefore concluded that SCT appear to be helpful in distinguishing singular factors, and parent's effect on the unfortunate conduct of smoking in youth children (Kouloumenta et al., 2009).

Another theory that we used and captures influences of smoking in a concentric fashion comes from the field of psychology: Bronfenbrenner's (2009) ecological theory. This theory mainly emphasises contextual influences or environmental

influences that bear different influences according to their proximity to the individual (Bronfenbrenner, 2009; Bronfenbrenner & Morris, 1998; Campbell, Pungello, & Miller-Johnson, 2002; Leonard, 2011). These influences are visually presented as concentric circles. For example, it postulates that children will first be impacted by parents, as they are immediate relatives. The next influence will be the school. The other outer concentric circle is that of religion, government and laws (see Figure 7). This makes this theory very relevant to this study because religion and laws shape a Muslim's way of life. This theory has already been applied in understanding smoking behaviour (Ennett et al., 2010; Hong, Lee, Grogan-Kaylor, & Huang, 2011; Wiium & Wold, 2009). A strength of this theory is that it also emphasises the interaction of these factors. However, its major weakness is that it assumes that personal influences are passive. It also does not acknowledge biological factors such as the sex of the child.

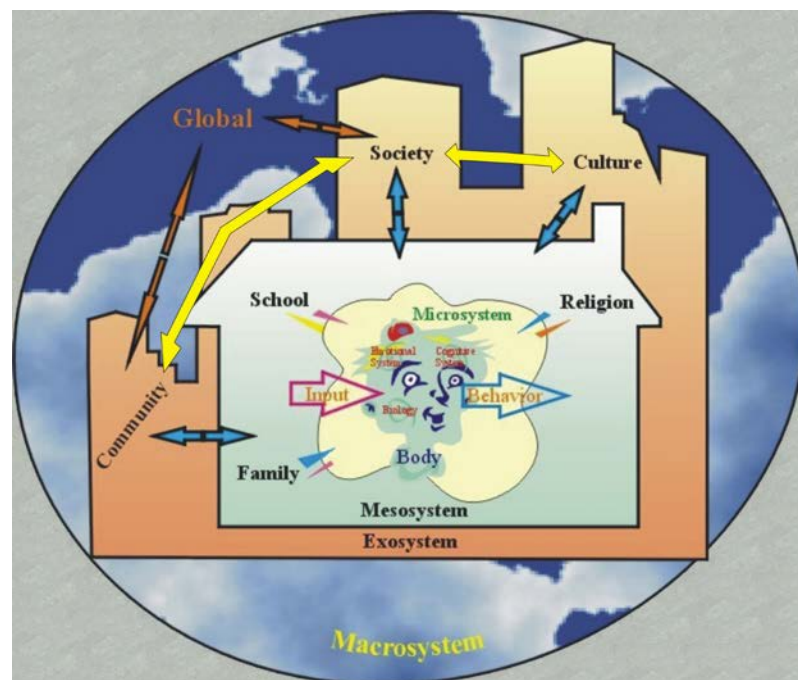


Figure 7. Bronfenbrenner's ecological systems theory (Ryan, 2001).

The next section focuses on the religion of Islam and the association between religion and smoking.

2.6 The religion of Islam

Islam is a religion of special significance in terms of its relation to the law and social practice and hence its teachings have a holistic impact on the lives of followers (Kabbani, n.d.). In Islamic doctrine the minimisation of harm to society and the individual follower is a central goal. The individual is instructed to refrain from any act that will harm their body or soul (Chamsi-Pasha & Albar, 2013; Gatrad & Sheikh, 2001; Islamic Relief Worldwide, 2014). This aspect of Islam is clearly relevant to any study of tobacco smoking among Muslims. It is therefore important to focus on concepts of religiosity and tobacco use, and how they are interrelated.

2.6.1 Islam as a governing factor

Islam shapes the lives of its followers. The Islamic way of life has a two-pronged effect of avoiding deliberate harm to self and of promoting the well-being of others. This doctrine has benefits to both the individual and others because of the focus on protecting lives, properties and the society at large (Auda, 2008; Kamali, 2016; Omran, 2012; Yasin, Firdaus, & Jani, 2013). There are some topics that may be general in the Qur'an (the Holy book of Islam), and in such instances the Sunnah is the source of guidance. The Sunnah is comprised of the Hadith and examples of transcripts of the Prophet made by companions (May Allah be pleased with them) (Mejia, 2007). Through these there is a space for religious judgment sometimes based on Ijma (consensus) and Qiyas (comparison). This involves the judging of a certain deed, case or situation based on tracking its origins from the primary main sources of Islam (Ghouri, Atcha, & Sheikh, 2006; Mejia, 2007). Banned or accepted acts in Islam religion are taken from the Qur'an and Sunnah, with a few modifications depending on the context and era in time (Auda, 2008; Kamali, 2016; Omran, 2012; ThoughtCo, n.d.; Yasin et al., 2013).

The key principles for all human affairs, the sources of Islamic laws, are classified into five categories (Al-‘Allāf, 2003; Bahammam, 2012), including; 1) Obligatory (Mandatory) = *Waajib*; 2) Recommended (Encouraged) = *Mustshabb*; 3) Morally Indifferent (Neutral) = *Mubah*; 4) Discouraged (Disliked) = *Makruh*; 5) Prohibited (Forbidden) = *Haram*. These last acts are bound by definitive proof in the Qur’an and Sunnah. Examples include killing, theft, unlawful sexual activity or adultery, drinking alcohol, and gambling (Al-‘Allāf, 2003).

Another relevant aspect is the age at which these laws are to be followed. It is said that every mature Muslim, regardless of sex, is obligated to follow the commands of Allah as said by approval through Prophet Muhammad (PBUH). Maturity is measured by reaching the age of puberty and being mentally competent; this means that in practice adolescents of both sexes are included.

2.6.2 Islamic juristic ruling on tobacco smoking (smoking laws in Muslim countries)

Generally speaking, most Islamic countries state that from the religious point of view smoking is an unwanted habit that negatively impacts the identity of a Muslim individual. The basis of this can be attributed to the fact that Islamic countries, and especially Arab-Muslim countries, tend to connect most of their earthly day-to-day matters to Islam. The rationale for this is that Islam organises the individual’s life and leads them to the right path. Therefore, the acceptance or the rejection of tobacco is connected to Islam through either *fatwa* or other paths.

Two issues have divided Islamic scholars about smoking cigarettes, WP or any other form of smoking: there has been no clear and direct doctrine addressing it (no religious text forbids it), and it does not intoxicate. Scholars still struggle to decide whether it is forbidden, disliked, or allowed depending on its health risks (ThoughtGo, n.d.).

According to Grand Imam Gadul Haq Ali Gadul Haq, who is a Sheikh of Al-Azhar Mosque, smoking started happening early in the eleventh century of the Hijra. According to him, smoking spread to the Muslim world through the Maghreb and Sudan by European influence (Al Khayat, 2000). Muslim jurists traditionally tended not to believe that smoking can have negative health effects and saw it as a neutral activity, believing it had benefits for the digestive system and even mental health effects (Ghouri et al., 2006).

However, in recent years the legal status of smoking has changed in many parts of the Arabic-speaking world. Islamic figures resorted to the concept of the *fatwa*. The *fatwa* is a Muslim religious practice that guides individuals or communities on any issue (Muhamad & Mizerski, 2013). The majority of religious scholars in MENA countries have recently made statements (*fatwa*) against smoking and classified smoking behaviour in all its different forms as totally *haram*. They base their decision on the following evidence. Firstly, smoking leads to serious health consequences like lung cancer and heart disease. A report by a U.S. Department of Health and Human Services stated that smoking cigarettes play a major role in causing many diseases: coronary heart failures, chronic bronchitis and other lung diseases (U.S. Department of Health and Human Services, 2014). Islam prohibits all acts that result in harming the human being and their neighbours. It also forbids people from acts of self-destruction, for Allah says: “*Do not kill yourselves; God is ever most merciful to you*” (Qur'an 4: 29). He also says: “*And spend in the way of Allah and do not throw [yourselves] with your [own] hands into destruction*” (Qur'an 2: 195). In addition, the Prophet Muhammad (PBUH) says: “*Do not harm yourselves or others*” (Sunnah.com, n.d.-a) and the Messenger of Allah (PBUH) “*prohibited every intoxicant and sedative*” (Sunnah.com, n.d.-c).

Secondly, smoking includes a large measure of extravagance and waste. Such things are forbidden under Islam, for Allah says: “*Eat and drink, but be not excessive. Indeed, He likes not those who commit excess*”(Qur'an 7: 31). He also says: “*Do not squander your wealth. Indeed spendthrifts are brothers of the devils, and the devil is ungrateful to his Lord*” (Qur'an 17: 26-27). Furthermore, the Prophet Muhammad (PBUH) said: “*God hates the squandering of wealth*” (Sunnah.com, n.d.-e). So Prophet Muhammad has prohibited spending money on useless matters (Sunnah.com, n.d.-i). Use of money on cigarettes is an act of disobedience to Allah and therefore Allah will never be pleased with such an act.

Lastly, cigarettes cause foul smells, and these are not pleasant to our neighbours. Like other things that cause smell, such as uncooked garlic, these things are unpleasant and condemned by Allah. For instance, such acts spoil prayer. The Prophet Muhammad (PBUH) said: “*Whoever eats garlic or onion, let him avoid us and our Mosque “Masjid”, and stay in his home*” (Sunnah.com, n.d.-d). Smoking spoils a person’s acts of worship and reduces their rewards.

However, as noted above, a minority of religious figures declare tobacco smoking as something that is permissible as there is nothing in the Qur’an that prohibits it (Muftisays, 2004).

In summary, the core idea of Islam as a religion is to protect the physical, psychological and social health of the human being. This can appear through the purposes of Islamic law (the protection of oneself, money, honour, religion, and brain). Tobacco consumption and smoking in general contradicts the protection of oneself, creating diseases, foul smells and wastage.

2.6.3 Historical Muslim actions against smoking

Historically in the Muslim world, anger towards smoking has been noted. According to Hussein Mujib al-Misri's *Farissiyat wa Turkiyyat*, there was a very hostile reaction towards smoking from the Ottoman Sultan Murad IV (r.1623–1640), who issued a decree that smokers would be hanged if found doing so. Murad IV further stated that the corpse of the executed smoker would be left to rot, wherever they were executed, even if it was a place that would require removal of corpses such as public places, private homes or shops of some kind. Furthermore, Murad IV regarded smoking as warranting the death penalty because this act diverted the human from the status of piety and led humans to focus on earthly pleasures (Anna, 2005).

Another example of a strict ruling is that of the punishment of a smoker when Shah Abbas I was ruling in the year 1629. The punishment included having the smoker's nose pierced, and in the hole a stick would be inserted. Abbas's son, Shah Safiyy, went even more hostile, ordering that molten lead emptied into the mouth of anyone found smoking (Mustafa, n.d.).

2.6.4 Current Islamic practice and tobacco use

According to Gezairy (2000) a regional director for the EMR at WHO, the EMR is very religious (World Health Organization, 2000). In 2006, the Islamic Board of Iftaa' in Jordan ruled in Resolution No. 109 that smoking was *haram* (Jordan General Iftaa' Department, 2006). This decision was based on studies that showed that smoking has bad consequences on health, environment, and the society. In terms of economic harm, smoking was seen as an extravagance. In Jordan, the annual lost expenditures that result from smoking are more than 1 billion JOD (NZ\$2 billion). In this respect the rationale for making it *haram* is that smoking deprives someone and their family of such basic needs as food, drinks, clothes, and rent.

Smoking is also forbidden in mosques and other public places, including busses (Jordan General Iftaa' Department, 2006). The principle of special significance here is that smoking is not allowed in these places because hurting others is not allowed in Islam. Consequently, the Iftaa' Board rules that trying not to smoke is not an option but an obligation, and that tobacco advertising and related influential strategies are prohibited (Jordan General Iftaa' Department, 2006). Because of tobacco's great harm to the world's population, WHO has declared May 31 World No Tobacco Day since 1988 (Time and date, 1995-2017; World Health Organization, 2017b).

In 2010 in Jordan, Mufti Dr. Noah Ali Salman (2010) issued Fatwa No. 652 stating that smoking WP is not permissible because it contains toxic substances and harmful compounds, causing immediate or delayed deadly diseases (Mufti Dr. Noah Ali Salman, 2010). More recently in 2017 the Islamic Board of Iftaa' issued Fatwa No. 3319, which made selling WP and offering it to others impermissible (Jordan General Iftaa' Department, 2017).

Other important sites such as Mecca and Medina have also been declared no-smoking sites from 2001 – the pronouncement was made in Saudi Arabia on World No Tobacco Day by the Late King Fahd. Saudi Arabia subsequently signed the WHO FCTC in 2004. Since then religion has been seen as instrumental in tobacco control for Muslims. The Saudi National Tobacco Control Programme has used this as a framework for primary prevention programmes. National legislation has also followed with the same bans in public places. However, apart from in Mecca and Medina, few cities in the Saudi Kingdom observe the regulations (World Health Organization, 2011b). Specific regulations prohibit smoking in Saudi Arabia in educational, health, sport and cultural institutions. Smoking is also banned in a number of places, such as the workplace, government offices, banks and all public transport facilities (Saudi

Gazette, 2016). With the overall support of such *fatwa* from religious figures in the Islamic regions, their viewpoints, attitudes, and criticism of smoking have the potential to reduce smoking prevalence and the associated harmful factors causing loss of lives and wealth in accordance with the Islamic sanctions (Ghouri et al., 2006).

2.6.5 Islam, second-hand smoke, and advertising

The Islamic position in relation to second-hand smoke is found in Sunnah, where the prophet (PBUH) says: “*Don’t cause any harm to yourself nor hurt others.*” Consequently, resisting smoking with all possible means is obligatory and publicising it or encouraging others to smoke is prohibited. Smoking causes harm to non-smokers and the Messenger of Allah said: “*There should be neither harming, nor reciprocating harm*” (Sunnah.com, n.d.-a). Greater appreciation of the risks associated with passive smoking has also led recent jurists to cite the obligation to avoid causing wilful annoyance, distress, or harm to other people. When a smoker prays in a congregation he hurts not only his fellow humans with his smell but the angels too (Sunnah.com, n.d.-d).

2.7 Links between religiosity and tobacco use among Muslims

Several studies have demonstrated that there is some association between religiosity and tobacco use (Alzyoud et al., 2015; Gillum, 2005; Giuliani et al., 2012; Gomes, Andrade, Izbicki, Moreira-Almeida, & Oliveira, 2013; Islam & Johnson, 2003; Koenig et al., 1998; Nakhaee, Divsalar, & Jadidi, 2009; Nor Afiah et al., 2012; Radwan et al., 2003; P. N. Singh et al., 2012; Yong et al., 2009). However, these associations are of varying strengths and the measures of religiosity are relatively simple. This is especially so in light of the complex relationship between Islam's tenets and tobacco use. It is important therefore to identify what elements of religiosity are actually critical to this association. One such element is religious teaching. For example, a religious message from Islam about smoking is that smoking involves a large measure of extravagance and waste. Such things are forbidden in Islam. A smoker burns his wealth for no good reason. The Qur'an says: "*But spend not wastefully (your wealth) in the manner of a spendthrift. Verily spendthrifts are brothers of the devils*" (Qur'an 17: 26-27), and Allah says: "*...and do not be extravagant, for God does not love the extravagant*" (Qur'an 6: 141; Qur'an 7: 31). Abu Hurayra reports that the Messenger of Allah (PBUH) said: "*Allah hates for you three things: gossips (irrelevant talk), begging (asking a lot of questions), and wasting money*" (Sunnah.com, n.d.-b).

In 2012 a cross-sectional study was conducted among 950 Muslim students aged between 11 and 18 in Zarqa, one of the major governorates in central Jordan. In this study Alzyoud et al. (2015) investigated the association between tobacco use and religious observance. A simple measure of religious observance was used that was based on three questions: "Do you pray?", "How many times do you pray each day?" and "How often do you attend religious events?" These were collapsed into three

categories: No commitment (no praying); Partial commitment (pray 1 to 4 times a day); and Full commitment (5 times per day or more). The study found an inverse relationship between the frequency of praying and prevalence of tobacco smoking. For example, the study found that students who prayed less than the mandated times a day were more likely to smoke compared to those who did the mandated number of prayers. In the same study, there were also significant associations between both cigarette and WP use and religious commitment, as demonstrated in Figure 8.

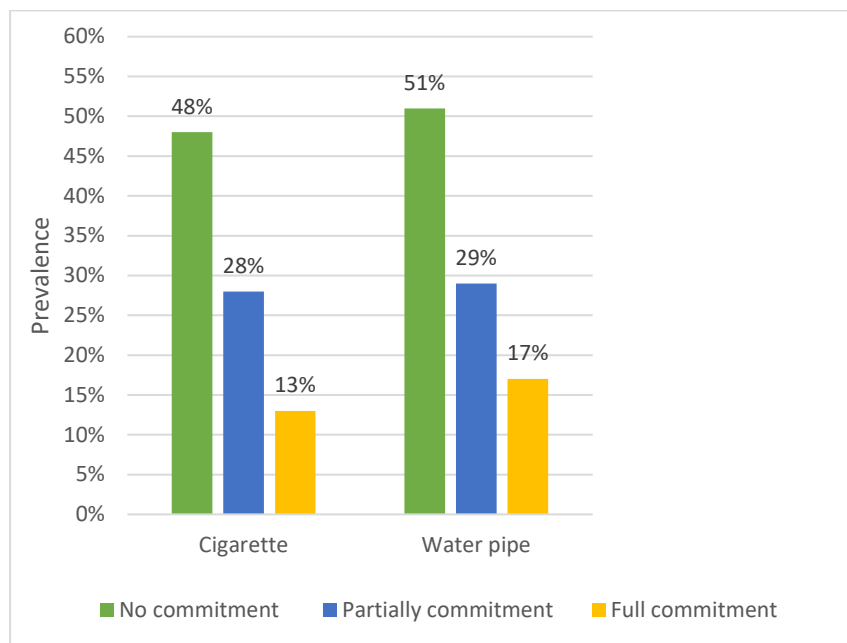


Figure 8. Association between religious commitment and tobacco use (Alzyoud et al., 2015).

However, pointing to the complexity of the relationship under study, such routines as attendance at Friday noon prayer in mosques and Qur'an classes were not significantly associated with either WP or cigarette smoking (Alzyoud et al., 2015).

Nakhaee et al. (2009) conducted a cross-sectional study involving 833 Muslim university students in Iran to find out the relationship between religious practices and cigarette smoking. The questions asked were about such practices as mosque attendance, obligatory religious practices (praying and fasting), and reading the

Qur'an. The results showed that the participants who frequently participated in religious activities, especially if they prayed regularly, were less likely to smoke cigarettes (Nakhaee et al., 2009). Religious activities may have an influence in controlling smoking among university students.

Another study of 4,944 Egyptian adult males (both smokers and non-smokers) showed cigarette smokers were more likely to believe that smoking was prohibited than WP users. Mixed users of WP and cigarettes were less likely to believe that smoking was prohibited. In this study, non-smokers were significantly more likely than smokers to believe that there is a religious prohibition on smoking (P. N. Singh et al., 2012).

Among 1,161 Muslim adults and 322 Muslims aged 12 years or above in Egypt the percentage of never smokers (84%) who believed that smoking is prohibited was higher than that of current smokers (75%). This result could be because there was a significant increase in the knowledge about the *fatwa* on smoking at the time of the study, with increased exposure to anti-smoking messages from religious leaders (Radwan et al., 2003).

Islam and Johnson (2003) aimed to understand the prevalence of smoking and its risks in accordance with the religious and cultural influences among 461 Muslim Arab-American youths in grades 7–12 at the Islamic Academy in Virginia. The results of this study showed that religious influence had a negative correlation with smoking for both sexes. However, since the students were from different Arab countries some Arab/Muslim cultural norms appeared to be more associated with the sample's susceptibility to smoking, as evident through the high percentage of male smokers compared to female smokers (Islam & Johnson, 2003). This could be attributed to the fact that within Arab/Muslim culture a male socialises more with peers and thus more

peer pressure in smoking initiation exists, while Arab/Muslim females are strictly supervised and Islam prohibits harm for both sexes.

Religion was also seen to work as a protective factor that may prevent non-smokers from smoking and help smokers to quit smoking in a study conducted by Nor Afiah et al. (2012). This study focused on the relationship between the religious personality and smoking among 928 school children aged 14 in Malacca, Malaysia, where Islam was the main religion at 92.1% among the cases (smokers) and 74.1% among the controls (non-smokers). Cases who were committed to the religion (38%) were protected from being smokers compared to the non-committed cases (62%).

The measures used were, for example, such practices as the reciting of Qur'an and doing prayers daily as required in the Qur'an. In addition, as in other studies of Muslim youth, the percentage of smokers among males was higher than that among females (Nor Afiah et al., 2012).

From another perspective, Yong et al. (2009) sought to understand the influence and the role of religion as a concept and religious authorities in efforts of tobacco control. The authors examined the degree to which religion influences the smoking behaviour among adult Muslim smokers in Malaysia (n=1482) and adult Buddhist smokers in Thailand (n=1971) aged 18 years or over. The results of this study showed that almost 90% of both groups reported that their religion helps them make daily and personal decisions in their lives. The majority (79% Muslims and 88% Buddhists) of both groups believed that their religion discourages smoking. Religion was therefore a key factor that discouraged them from smoking. This study was also of significance in quitting smoking efforts as more than half (61%) of Muslims and (58%) of Buddhists reported that their religious authorities encouraged them to quit smoking. Among the

“very religious” there was more likelihood to intend to quit within the next 6 months and to have greater success at quitting (Yong et al., 2009).

Another cross-sectional study was conducted among 392 Somali Muslim adults aged 18 years or over in Minnesota by Giuliani et al. (2012). The results showed that religion could control tobacco use. Never users strongly believed that tobacco should be banned in Islam ($p < 0.0001$) (Giuliani et al., 2012). In contrast, a recent study was conducted by Arfken et al. (2015) among 156 Muslim university students in the United States (aged 18 years or over) to understand the association between religiosity with WP smoking. Questions on Islam’s standpoint on using alcohol, cigarettes or WP were utilised. The results of the study demonstrated that Muslim students are at high risk from WP smoking and Islam was not a defensive element against lifetime WP use (Arfken et al., 2015).

To examine whether these associations were unique to Muslim populations, studies of Christian populations were also examined to ascertain whether associations between religiosity and smoking were unique to Muslim populations. Koenig et al. (1998) studied the relationship between Christian religious activities and the use of cigarettes among older adults. This research studied 3,968 Christian adults from Oklahoma City, United States, aged 65 or older. The results of this cross sectional survey showed that individuals who attended religious services on regular basis were less likely to smoke cigarettes. Overall, individuals who were exposed to religious services, private religious activities and/or religious radio or television were less likely to smoke cigarettes (Koenig et al., 1998).

The protective effect of religious attendance was also demonstrated by the 1988–1994 US National Health and Nutrition Examination Survey among 18,774 adults aged 20

years and over. Results showed that high-frequency attendance at religious gatherings was inversely related to smoking cigarettes (Gillum, 2005). Another study was conducted by Gomes et al. (2013) to investigate the relationship between religiosity and drug use among 12,595 Christian university students in Brazil. The authors found a direct relationship between not going to religious gatherings and smoking among students (OR=2.83; 95% CI 2.09, 3.83), alcohol (OR=2.52; 95% CI 2.08, 3.06). Associations were also found between not going to church and use of marijuana (OR=2.09; 95% CI 1.39, 3.11) and illicit drugs (OR=1.42; 95% CI 1.12, 1.79). This study suggests that religiosity could be a strongly protective factor against drug use among Brazilian university students (Gomes et al., 2013).

This literature review shows that there is considerable evidence of an association between smoking and religion. This association is not unique to Islam, but it is significant that under Islamic jurist rulings the concept of smoking is highly prohibited. It is important to identify the elements of Islam that impact upon preventing initiation and maintenance of tobacco smoking behaviour. This review demonstrates the importance of identifying tobacco control strategies for the high proportion of Muslim populations within developing countries, which are increasingly being targeted by tobacco companies.

2.8 Chapter summary

This chapter has shown that WP and cigarette smoking is a major health issue in MENA countries, which justifies more research into this topic. Further justification comes from the fact that this issue seems to be affecting children in this region at a very young age. In addition, it appears that the religion of Islam has aspects that can be used as a tobacco control strategy.

Smoking in Islam seems to have a long tradition of not being accepted, and seems to have originated from the interaction of the Arab world with Western Europe. It is therefore worrying that the phenomenon is now getting worse than in the presumed source countries (Europe). However, given the vagueness of messages about whether smoking is banned or not in Islam, more research is needed to find out what aspects of religiosity can play a role in smoking cessation programmes.

Lastly, this literature review has explored the links between tobacco use and Islam to inform the development of a measurement tool to measure religiosity in Muslim youth. This tool can then enable research to be undertaken in order to identify the dimensions and facets of the Muslim religion. The religious nature of Jordanian children based on their Islamic beliefs and Islamic practices will inform a modified measurement tool that is appropriate for Muslim youth in order to measure the degree of their religiosity in accordance with their smoking/initiation into smoking.

Chapter 3 : Methods

This chapter describes the design of the research reported in this thesis. A pilot repeated cross-sectional study was conducted among Muslim students enrolled in the 5th and 6th grades within the Irbid Governorate in the north of Jordan in 2015, with a follow-up 12 months later. The current pilot study enabled the examination of the association between religiosity and prevalence of smoking cigarettes and WP among Muslim youth, and obtained data to inform a potential full study in the future. This the first study to examine these associations using a modified multidimensional religiosity scale for Muslim school children in Islamic societies.

3.1 Pilot study methodology/design

The data were collected at two time points from a primary school-based during the first semester of 2015 and the first semester of 2016 in Irbid, Jordan. The target population was all students who were enrolled in the 5th and 6th grades. For the purposes of this study, only public (government) and private schools teaching 5th, 6th and 7th graders in Irbid were eligible for participation.

3.1.1 Repeated cross-sectional design

The study was of a repeated cross-sectional design, measuring participants at baseline and then following up the same schools 12 months later. This was to enable estimation of smoking prevalence and changes in prevalence, to demonstrate what changes occur in this critical period of initiation and to develop a complex model incorporating both years and smoking modality (cigarette or WP). The original design was longitudinal aimed at examining both prevalence and initiation. The attrition of approximately 25%

in the second year was unexpected, and made conclusions regarding initiation weaker because possibly biased. Thus, participants who participated in 2015 only and in 2016 only were also included.

3.1.2 Grade

Grades 5 and 6 in 2015, and 6 and 7 in 2016, were selected to include students young enough to be at the experimentation and initiation phase of smoking, in order to follow them during the phase of potentially establishing and maintaining the habit.

3.1.3 Entry criteria

Students were eligible to participate if they were Muslim; in 5th or 6th grade at baseline in 2015 or in 6th or 7th grade in 2016; and living in Irbid. They also had to provide a signed consent form from their parents as well as a child assent form. Students who reported being non-Muslim in the questionnaire and who provided consent and assent forms were not excluded from the data collection, but were excluded from the analyses.

3.1.4 Geographical location

To enhance feasibility of the pilot study, the schools were recruited from a single governorate in Jordan, Irbid. Irbid is one of the four governorates in the northern region of the country. It is located north of Amman, Jordan's capital. Irbid harbours a total population of 1,770,158 or 18.6% of Jordan's population. This governorate was chosen because adolescents from urban, suburban and rural populations are represented in it. It has the second-largest population in Jordan after the Amman Governorate. Irbid is more representative of the regions of Jordan outside of Amman (Jordan Department of Statistics, 2015).

3.1.5 Local population characteristics

The total number of students enrolled in both primary and secondary schools in Irbid is estimated to be 341,741 (172,297 boys and 169,444 girls) (Jordan Ministry of Education, 2012). A list of city school names and numbers of students was obtained from the Ministry of Education (Jordan Ministry of Education, 2012).

The total number of students enrolled in schools teaching 5th, 6th and 7th grade students considered for participant recruitment was estimated to be 34,727, with 29,964 in public schools and 4,763 in private schools. The total number of schools was 376: 132 male schools (131 public, 1 private), 51 female schools (51 public, 0 private) and 193 mixed-sex schools (132 public, 61 private) (see Table 2).

Table 2. *Eligible schools and their student numbers in the 5th and 6th grades in Irbid*

	Public schools				Private schools				Total
	Male	Female	Mixed	Total	Male	Female	Mixed	Total	
No. students	13,368	5,848	10,748	29,964	132	0	4631	4763	34,727
No. schools	131	51	132	314	1	0	61	62	376

3.1.6 Sample size

We justify the sample size on the basis of the primary aim of the study. A sample size of approximately 900 was sufficient to detect an odds ratio of having ever smoked cigarettes (respectively, WP) of approximately 0.7 (respectively, 0.8) under a change of one standard deviation of a continuous measure (such as a religiosity score), which is small enough to be meaningful, assuming multicollinearity of $R^2 = 0.4$ of this measure with other covariates (Vatcheva, Lee, McCormick, & Rahbar, 2016). Such odds ratios correspond approximately to a decrease of 4 (respectively, 5) percentage points from the overall prevalence of having ever smoked cigarettes (respectively,

WP), assumed to be 18% (respectively, 30%) based on preliminary information available about cigarette and WP use from a previous study in Jordan among high school students (Mzayek et al., 2011).

3.1.7 School sampling

The statistical report for the year school 2013/2014 by Jordan ministry of Education (2015), summarized in Table 2, was used to select schools. The schools were first stratified by school type. Schools were stratified into public or private and sex-specific versus mixed-sex schools.

Given available resources in time and material, it was judged that five schools could be feasibly surveyed. In order to cover the different types of schools in Jordan, we randomly selected 2 public male schools, 1 public female school, 1 public mixed school (with girls only in the selected grades) and 1 private mixed school, all of which offered 5th, 6th and 7th grade education. The schools were selected with probability proportional to size, within their own strata.

In order to avoid the risk of not reaching the target sample size due to the selection of overly small schools, we limited eligibility for inclusion into the pilot study to schools with total role in grades 5, 6 and 7 greater than or equal to 90. It was found that the expected role in grades 5 and 6 would then be sufficient to reach the sample size if all classes at those grades were surveyed in the selected schools. A sufficient number of students returning a signed parental consent form was thus reasonably insured in 5th and 6th grades. For the purpose of the pilot study to gain coverage across the different school types, schools were randomly selected from each school category list. All students in grades 5 or 6 in 2015 and grades 6 or 7 in 2016 were invited to participate in the selected schools.

3.2 Procedure at baseline

3.2.1 School recruitment

A publicly available list of school names including school phone numbers and student numbers was obtained from the Department of Education in Jordan. The investigator carried a letter from Auckland University of Technology (New Zealand) to the Jordanian Ministry of Education to request support for the research and to facilitate access the schools in Jordan for both phases (see Appendix D). This letter of support was included in the ethics application at AUT in Auckland, New Zealand. In addition it was provided to the school principals to assist in informing their decision about whether to allow the research to be undertaken in their schools (see Appendix E).

The selected schools' principals were contacted by telephone in 2015 and, if they agreed to join the study, were met by the investigator to be provided with a full description of the study's goal and procedures. In case of refusal to participate, the next randomly selected school in the appropriate strata was approached similarly.

Written permission was also obtained from each school principal prior to data collection in both years. Discussions were conducted with each school on how best to manage the children with and without full consent/assent forms to minimise coercion and selecting the best dates for data collection. A list of students' names was obtained from each school principal for each class prior to data collection, which was timed to coincide with non-essential school activities such as sports, art and vocational classes.

3.2.2 Student recruitment (Inclusion/exclusion criteria)

Muslim students were eligible to participate if they were (1) in 5th or 6th grade at baseline; (2) living in Irbid, Jordan; (3) from public and private schools; and (4) able to provide consent form from their parents for agreement. Consent was sought from

parents for students to participate in this study and an assent form was signed by students for the two data collections waves (see Appendix F, H).

The consent form for parents and an information sheet were sent home with the students for both phases as the mail service was unreliable (see Appendix G, I). A small number of children identified as non-Muslim when completing the questionnaire, although information sheets, consent and assent forms all stated that the research was for Muslim youth, and were therefore excluded from the analysis.

3.2.3 Questionnaire development

The English versions of the questionnaire (see Appendix A). Assent Form, Participant Information Sheet, Parent Information Sheet and Parental Consent Form were translated into Arabic and then translated back into English for verification (see Appendix F-I).

The questionnaire was composed of three sections pertaining to sociodemographic, religiosity scale, and tobacco use behaviour (Youth cigarette and WP smoking, family & peer influence and family attitude). The same questionnaire was used for both phases.

The questionnaire was reviewed by 18 academics who are experienced peer reviewers at JUST and Yarmouk University in the areas of Islamic studies (religiosity), educational psychology (adolescent health), education, public health and medicine in the area of tobacco use (see Appendix K). In addition, Dr Nihaya A. Al-Sheyab (research co-supervisor) and Dr Khalid A. Kheirallah (research official advisor) have both previously been involved in research with children in Jordan. In addition, the questionnaire was pilot-tested among 20 students.

3.2.4 Questionnaire protocol for 2015

The investigator visited all the grade 5 and 6 classrooms within the consenting schools with sex-specific research assistants (see Appendix J) to provide information on the research and provide packages containing information sheets and assent and consent forms for the children to take home to their parents. All communication and forms were administered in Arabic. Additional copies were provided to the school in case children misplaced the forms and requested replacement ones. On the days of data collection, all Muslim students in the participating schools in the 5th and 6th grades were eligible to participate if they had provided signed consent forms.

The questionnaire was administered in Arabic (see Appendix A) in situ by the investigator. Initially it was planned to use an internet based questionnaire as the primary data collection tool, with printed questionnaire as a backup. However, for all the schools that participated either there was no reliable internet connections available despite information from the Ministry of Education saying there should be; or access to the school computers was limited with high demand and schools giving priority to grades 7–12 over the younger children. Therefore to lack of reliable accessible internet access and to reduce discrepancies due to different data collection methods, it was decided to use printed questionnaire for all the participating schools.

The questionnaire was administered to students in each classroom separately where a teacher, primary investigator and a sex-specific assistant were present (classes in Jordan are separated by sex). For female schools and mixed schools we reduced power imbalances by using a female facilitator (research assistant) for female students. After a brief introduction by the teacher, who then left the classroom, the primary investigator explained the nature of the survey by stressing two points: participation

was voluntary and names were not required, to ensure confidentiality of the information provided.

The primary investigator had a master list of students for each school, grade, and class. Each student was numbered on the master list and the number was written on the first page of their questionnaire. Then the students were explained the purpose of the study, shown how to answer the questionnaire, reassured regarding the confidentiality of their data, and had their questions answered.

The present study was designed to make participants comfortable through providing sufficient space between each student for privacy. The investigator explained to the students that the answers were not for examination. Any question that arose during the completing of the questionnaire were answered by the primary investigator or research assistant.

Approximately 15 minutes were taken before starting the data collection for preparation and introduction. To improve the accuracy of students' responses, no teachers or other school personnel were allowed in the classroom during data collection. Questionnaires were collected by the primary investigator and assistant at the end of the session. Approximately 5–7 days were taken for each school. All consent forms were stored in a locked cabinet by Dr Nihaya Al-sheyab, in her office at JUST.

The study protocol was reviewed and approved by the Auckland University of Technology Ethics Committee (AUTECH) (see Appendix B) and the Ministry of Education in Jordan (see Appendix E).

3.2.5 Study onset date

School recruitment started in September 2015. Data collection in schools began in November 2015 after parental consents and student assents were obtained. The same schedule was adhered to for the 12-month data collection in 2016

3.2.6 Confidentiality and linkage

All information, privacy and confidentiality were protected at 2015 and at 12 month follow-up in 2016. No details on participants were collected until after consent and assent forms were collected. All participants were anonymised; names were only present in consent forms.

To link the baseline and follow-up questionnaires from the same students while ensuring confidentiality, a table of codes was kept associating their school identification code, school number, authority, school sex, grade, class and student ID to a unique, randomly generated Student ID to be kept confidential by the investigator. The students' questionnaires was identified through the generated code; the investigator did not ask the students to remember their own codes. New codes were given for new participants at the second phase. The table of codes was destroyed after data analysis.

3.3 Procedure at 12-month follow-up

Twelve months after the 2015 baseline data collection, the same schools were visited and data collected from all students in grades 6 and 7. For consistency, the questionnaire at 12-month follow-up was identical to the baseline questionnaire. The same procedure was used again at follow-up.

The investigator took another letter from the Ministry of Education (see Appendix E) to the school principals reiterating the Ministry support for the second phase of research. The primary investigator asked for a new list of students for each grade and each class to match the codes of students at baseline with the follow-up lists. The primary investigator gave new codes for new participants at follow-up. Data were collected from students not seen at baseline which was used in the repeated cross-sectional analysis only.

After the second data collection codes were written on the first page of each questionnaire associating their school identification code, school number, authority, school sex, grade, class and student ID. The students' questionnaires were identified through the generated code in order to match students across the two years; the table of codes were destroyed after data analysis.

The study protocol for the second data collection was reviewed and approved by AUTECH (see Appendix C) and the Ministry of Education in Jordan (see Appendix E).

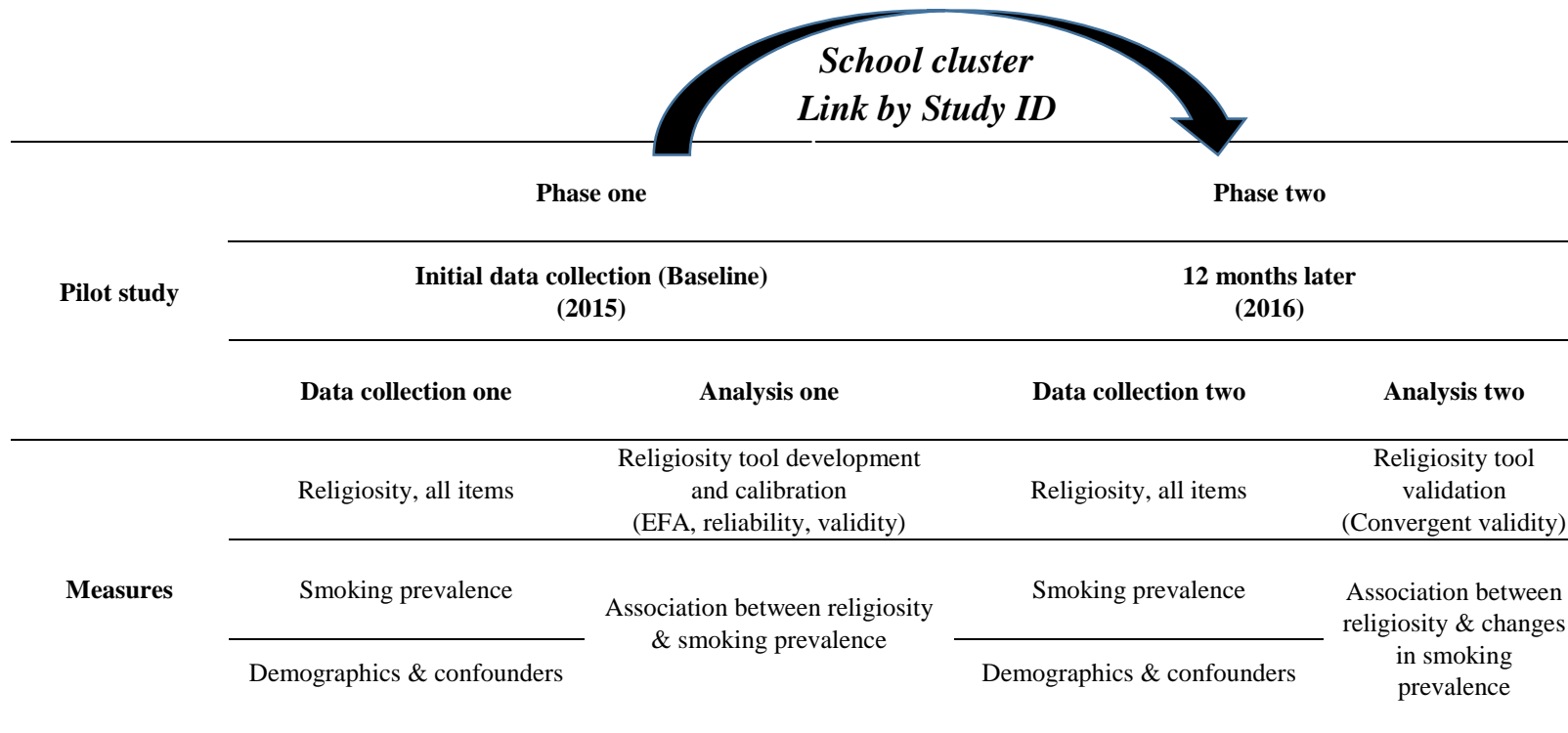


Figure 9. Overview of study design

3.4 Measures/survey instrument

3.4.1 Religiosity measures

The purpose of the tool to be developed was to measure relevant dimensions of Muslim religiosity in Muslim children. The initial religiosity measurement tool for Muslim schoolchildren we are proposing is ultimately based on Glock's (1962) multidimensional concept of religiosity (Glock, 1962). This concept formed the basis for a religiosity measurement tool among Muslim adults developed by El-Menouar (2014). Validated questions from other sources were also considered and adapted in the development of the initial tool (Abu Raiya, Pargament, Mahoney, & Stein, 2008; Alzyoud et al., 2015; Hassan, 2007; Salleh, 2012). In addition, new schoolchild-appropriate questions were adapted from the curriculum for Islamic education in Jordan (Jordanian Ministry of Education, 2006, 2007, 2008a, 2008b). The final tool, including El- Menouar's original dimensions, is displayed in Table 8 and more details are in the religiosity tool development section in Chapter 4.

3.4.2 Ruling on smoking in Islam

To assess students' understanding of the ruling on smoking in Islam, participants were asked, "What is the ruling on smoking in Islam?" (Yong et al., 2009). The children could answer either "Forbidden (*Haram*)", "Discouraged (*Makruh*)", "Desirable" or "Don't know".

3.4.3 Sociodemographic measures

Standard sociodemographic data were obtained from students using an instrument developed previously in Arabic, including age, sex, grade, nationality, religion, living with parents, school type (public/private), daily pocket money, father's education and mother's education (Karma McKelvey, 2014; Mzayek et al., 2011).

We needed to account for the relationship between socioeconomic status (SES) and adolescent smoking. The SES of the children and their family was assessed using four measurements: the daily pocket money available to the child, the father's education, the mother's education and an asset-based Wealth Index.

The Wealth Index for the present study was established by asking the children whether their home was equipped with any of a list of items (portable computer, flat TV, dining room table, internet at home, cell phone, and microwave); whether their family had a maid; and whether their house was rented. Respondents answered "Yes" or "No" to these questions, and the child-specific Wealth Index was computed by counting the number of "Yes" responses, yielding a score between 0 and 8.

Similar wealth indexes have been assessed and used previously in other studies in Jordan, although the list of items involved differed and weights were applied (Jordan Department of Statistics & ICF International, 2013; Sweis & Chaloupka, 2014). Our Wealth Index is unweighted, by contrast, as we did not have access to population proportions of ownership, which are typically used to create these weights.

We selected the Wealth Index as a measure of SES as we had concerns that children were ignorant of their family's gross income at their age, and that a proxy measurement about which they had knowledge would provide a more accurate measure of family wealth. Bollen et al (2002), in evaluating a number of asset-based wealth indexes, concluded that *"a very common way of proxying for economic status – using a sum of the number of goods owned by the household – performs relatively well compared with several other proxies [they] examined."* Further, they indicated that while asset-based wealth indexes were not robust to economic outcomes, *"if the focus is on variables representing noneconomic status [such as smoking status], the estimated effects will be more robust with different proxies."*

3.4.4 Tobacco use measures

Two types of tobacco use were assessed: cigarette smoking and WP smoking, using standardised items from the GYTS which was conducted in Jordan in 2009 by WHO and the CDC among students aged 13–15 years (CDC, 2010). A validated questionnaire that was developed using international guidelines (World Health Organization, 1998) and instruments tested and validated in Arabic (Global Youth Tobacco Survey Collaborative Group, 2002; Warren, Lee, et al., 2009) and previously tested in Jordan (Al-Sheyab et al., 2014; Alzyoud et al., 2013; Mzayek et al., 2012) was used.

It should be mentioned here that the use of electronic cigarettes was not investigated because electronic cigarettes are not very common and accessible in Jordan yet. In Jordan this form of smoking is very expensive and children within the sample did not have access to it.

For the purposes of this study, the investigators used selected items and standardised questions of the GYTS. To ensure equivalence of meaning across the surveys, questions from the GYTS were translated from English into Arabic, and then back translated from Arabic into English, by a group of bilingual professional personnel. The two versions were compared and modified until all translators agreed that the translation was accurate.

3.4.4.1 Youth smoking measures

Students were asked 14 questions specifically for youth smoking taken from the GYTS 2009–Jordan (CDC, 2010) and previously used and tested in Arabic in Jordan (Al-Sheyab et al., 2014; Al-Sheyab, Kheirallah, Mangnall, & Gallagher, 2015; Maziak, Ward, Soweid, & Eissenberg, 2005; Karma McKelvey et al., 2013; Mzayek et al., 2012).

A student was defined as an “ever smoker” if he/she reported ever experimenting with smoking and “never smoker” if he/she reported never having experimented with smoking. Ever smoking of WP or cigarettes was assessed using two “Yes/No” questions: “Have you ever tried or experimented with cigarette smoking, even one or two puffs?”; and “Have you ever tried or experimented with shisha smoking (WP, argila, hubble-bubble, nargila), even once?”

“Age at initiation” was the reported age at which a student experimented with cigarette (or WP) for the first time. To assess the age of initiation, participants were asked two questions: “How old were you when you first tried a cigarette?” and “How old were you when you first tried smoking shisha?” Response options ranged from less than or equal to 7 years to 13 years old or older.

To assess the frequency of use (number of days smoked) in the past 30 days, participants were asked two questions: “During the past 30 days (one month), on how many days did you smoke cigarettes?”; and “During the past 30 days (one month), on how many days did you smoke shisha?” Response options ranged from none to all 30 days.

To assess the total amount smoked per day in the past month (daily prevalence), participants were asked two questions: “During the past 30 days (one month), on the days you smoked, how many cigarettes did you usually smoke?” Response options ranged from none to more than 20 cigarette per day. To assess the average number of tobacco portions or hagar (rocks) used in WP smoking, participants were asked the question: “ During the past 30 days (one month), on the days you smoked, how many shishas rocks did you usually smoke?” (previously used in Arabic by (Alzyoud et al., 2013). Answer options ranged from none to more than 5 rocks.

Source of cigarette smoking was assessed using question: “During the past 30 days (one month), how did you usually get your own cigarettes?” Respondents answered either “None”, “Bought them”, “Gave someone else money to buy them”, “Borrowed them”, “Stole them”, “An older person gave them to me” or “Got them some other way”.

To assess the usual place of WP tobacco smoking, participants were asked question: “Where do you usually smoke shisha?”, which has been previously used in Arabic (Alzyoud et al., 2013). Response options included “Nowhere”, “At home”, “At a coffee shop”, “At a restaurant”, “At a friend’s house” and “Other”.

Students who had never experimented with cigarette or WP smoking, not even one or two puffs, answered questions related to susceptibility to smoking. This was measured using two questions for both WP and cigarette smoking based on the definition of susceptibility to smoking established by Pierce, Choi, Gilpin, Farkas and Merritt (1996), which has been used elsewhere (Aslam, Zaheer, Rao, & Shafique, 2014; Jaber et al., 2015; Kheirallah et al., 2015; Spelman et al., 2009; Veeranki, Alzyoud, Kheirallah, & Pbert, 2015; Veeranki, Mamudu, Anderson, & Zheng, 2014; Wong, 2013). Participants were asked: “If one of your best friends offered you a cigarette, would you smoke it?”; and “At any time during the next 12 months, do you think you will smoke a cigarette?” Responses were rated on 4 alternatives, viz. “Definitely not”, “Probably not”, “Probably yes” and “Definitely yes”. Similar questions were asked for WP smoking.

Participants were also asked two questions to assess the type of people participants were with when they first tried smoking: “Who were you with when you first tried a cigarette?”; and “Who were you with when you first tried shishas?” To assess the type of people participants were with when they usually smoked, participants were asked

two questions: “Who are you with when you usually smoke cigarettes?”; and “Who are you with when you usually smoke shishas?” Responses were rated on 5 alternatives, viz. “Alone”, “With parents”, “With other family member”, “With friends” and “Other”.

3.4.4.2 Family and peer influence

Measures of social influences to smoke, specifically parental and peer influences, were adapted from the GYTS 2009–Jordan environmental module (CDC, 2010). In addition, theory of social cognitive factors were merged within the measuring process, based on the assumption that an individual (child) learns from the surrounding environment that is around them.

Familial status of the parent (family discord) and their attitude towards smoking in general were also included. Six questions were taken from the GYTS 2009–Jordan. Participants were asked about smokers in the family using questions previously used in Arabic (Kheirallah et al., 2015): “Do your parents smoke cigarettes?” Responses were rated on 5 alternatives, viz. “None”, “Both”, “Father only”, “Mother only”, and “I don’t know”. Students were considered to have a smoking parent if they indicated that either their father or mother smoked cigarettes. Students were also asked about to report the number of people in their house other than their parents who smoked: “Does anyone in your house other than your parents smoke cigarettes?” Respondents answered “Yes” or “No”. Students were also asked about to report the number of closest friends who use tobacco: “Do any of your closest friends smoke cigarettes?” Respondents answered “None of them”, “Some of them”, “Most of them” or “All of them”. Similar questions were asked for WP smoking.

3.4.4.3 Parents' attitudes

Students were also asked about their family's attitude to smoking and these questions were adapted from the school-based Keeping Kids Smokefree (KKS) study among New Zealand Asian youth (Wong, 2013). They included: "Parents would be upset if they knew I smoke cigarettes"; "Parents have set specific rules for not smoking cigarettes" and "Parents think that it is OK for people under the age of 16 to smoke cigarettes". Response options included "Agree", "Disagree" and "Don't know". Similar questions were asked for WP smoking (Wong, 2013).

3.5 Statistical analyses

The statistical analyses consisted of two main tasks: feasibility analysis (smoking) and psychometric analysis (religiosity measurement tool development). Statistical analyses were performed using SAS version 9.4 (copyright 2002-2012) and R version 3.3.3 (R Core Team, 2017).

3.5.1 Feasibility analysis

The purpose of the feasibility analysis was to carry out preliminary inferential analysis in order to obtain estimates to inform the design of the full study. The feasibility analysis was comprised of two main tasks: descriptive analysis and inferential logistic regression (simple and multiple logistic regression models for 2015, and single-factor and multi-factor bivariate logistic models for 2015 to 2016).

Some questionnaire questions with more than two possible response categories were presented in their original categories for the descriptive analysis, but were collapsed into two or three categories for the logistic analyses due to small numbers in some categories. The variables which were re-categorised are presented in Appendix L.

The descriptive analysis produced data summarised as number and percentage of total. For the 2015 baseline analysis binary logistic regression analysis (logistic procedures) was performed to measure the association of religiosity and tobacco smoking. The SAS procedure PROC GLIMMIX was used for the repeated measures analyses, which accounted for clustering of schools and the two time points; 2015 and 2016. PROC GLIMMIX utilises each measurement, repeated or not, in quasi-longitudinal analyses (defined in Chapter 6) to find adjusted effects of each variable and fit generalised linear mixed models. Simple and multiple regression analysis (logistic procedures) using GLIMMIX was performed to measure the association between tobacco smoking and the various factors of interest, also examining the interactions of the variables of interest with year; and with smoking modality (cigarette or WP).

For both the 2015 baseline data analysis and the repeated data analysis, the variables of interest were grouped into domains, e.g. sociodemographic, youth cigarettes and WP smoking, family and peer influence, parental attitudes, and religiosity. Initially, simple associations for 2015 and bivariate associations for 2016 were examined for all the variables of interest with the outcome measures. Then a purposeful stepwise selection procedure (Bursac, Gauss, Williams, & Hosmer, 2008) was used to build the multiple variable model for both the 2015 baseline analysis in Chapter 5 and all available measures in Chapter 6. Variables within each domain was considered for inclusion in the multiple variable model based on a pre-specified criterion of $p < 0.2$ for the simple and bivariate associations. Stepwise selection was then undertaken for each domain to identify the best subset of variables within that domain. Final results from all the domains were then brought together and a final stepwise selection was undertaken to identify the final model.

Results of the logistic regressions is presented with odds ratios (OR) and 95% confidence intervals (CI); p-values of <0.05 were considered statistically significant.

3.5.2 Psychometric analysis

The development of the religiosity measurement tool for Muslim children was based on a psychometric analysis of the baseline data collected on religiosity items. Exploratory factor analysis (EFA) with non-orthogonal rotation (oblimin) was performed in order to determine the dimensional structure of the items. A direct oblimin rotation was chosen as there was no reason to believe a priori that the factors were uncorrelated. Throughout the process of EFA items were deleted that did not load properly on a particular factor (<0.40) (Kline, 1994; Laher, 2010). The internal consistency of each item was assessed using Cronbach's α on standardised items. Convergent validity of the factors was assessed using the Spearman's rank-order correlation, the association between the religiosity factors and three anchor questions, and Cohen's d equivalencies.

Chapter 4 : Religiosity measurement tool development for Muslim students

4.1 Introduction

This chapter describes the development and validity assessment of a novel religiosity measurement tool for use among Muslim students in Jordan. The tool is based on the work of El-Menouar (2014), who proposed a tool based on the Glock (1962) model and investigated its structural validity and internal consistency. For the current research, a sample of Muslim students were asked religiosity-related questions and the responses were tested for internal consistency using Cronbach's α and structurally validated using EFA. Their factor scores were tested for convergent validity against anchor questions using logistic regression and Pearson's correlation coefficient. The scales were found to be psychometrically adequate and significantly related to religiosity among Muslim students.

The chapter begins by defining religiosity and then justifies the need for a Muslim- and youth-specific tool. The chapter also presents an overview of what has been done so far with regard to the development of measuring tools for Muslim religiosity and presents the EFA results, followed by an account of the properties of the new tool.

4.1.1 Definition of religiosity and related concepts in Islam

Defining religiosity, and Muslim religiosity in particular, is a necessary step in developing a relevant religiosity scale. Before defining religiosity, it is important to define religion. Hagevi (2002) defined religion as a coherent system of beliefs, values, and behaviours that is related to a supreme being or transcendent reality and unites

those who adhere to it into a bonded community. As for religiosity, one simple definition is that it is a subscription to beliefs and doctrines which are institutionalised (Vaughan, 1991). Another definition is that religiosity is an organised system of beliefs, practices, rituals and symbols (Pargament, Koenig, & Perez, 2000). A more comprehensive definition comes from Argyle and Beit-Hallahmi (1975), who defined religiosity as a system of beliefs in a supreme being or a divine super power, and the practices that include worship or rituals directed to and by such a power. Other scholars argue that to find out about a person's religiosity one needs to ask the person about its importance of in their life; what they see as definite authoritative tenets and codes of such tenets; the importance of God; and the strength of consolation and solace received from religion (Halman & Draulans, 2006). One common thread that can be found in all the definitions above is that religiosity is both a subjective and a relational experience.

Other scholars offer useful definitions of religiosity in the sense that they explain what religious involvement entails or the specific aspects of religion: practices, the degree of belief in the religion's determinants, and the way an individual deals with their own religious tendencies (Demerath & Hammond, 1968; Holdcroft, 2006). Furthermore, Hagevi (2002) sees religious involvement as the emotional attachment of the individual to the values, beliefs and behaviours of a religion as a social reference group. Examples of practices or religious involvement are frequency of religious attendance, communal preference and frequency, doctrinal orthodoxy and devotion (Lenski, 1961). In terms of practices and tendencies, King (1967) proposed a list of such items, which includes creedal assent, participation in religious activities, religious experience, ties in congregation, commitment, openness to religious growth, dogmatism, financial tendencies and reading and talking about religion.

4.1.2 Rationale: Religiosity, health, and well-being

A number of studies have revealed a positive association between religiosity and health (Chatters, 2000; Koenig & Al Shohaib, 2014b; Shmueli & Tamir, 2007). Indeed, in research on religiosity and mortality it was once found that there is a strong and consistent association between mortality risk reduction and attendance at church services (Powell, Shahabi, & Thoresen, 2003). In the psychosocial dimension of health, studies have also confirmed a relationship between religiosity and mental health in specific populations (Koenig & Larson, 2001; Larson et al., 1992). Similarly, in the physical dimension of health, some studies have confirmed the association between religiosity and management of non-communicable diseases (Fraser, 1999; Hixson, Gruchow, & Morgan, 1998; Schnall et al., 2010). In the present study, religiosity is being considered in relation to smoking as a first step in developing or refining smoking cessation interventions among young people in Jordan.

From the 1960s to the present there has been an increase in the number of studies aiming to produce religiosity-related measurement instruments (Glock, 1962; Huber & Huber, 2012; Joseph & DiDuca, 2007; Stark & Glock, 1968). However, these studies have until recently focused on Christian religion (Welch, Tittle, & Grasmick, 2006) or been generic and included any religion practised in Europe (Halman & Draulans, 2006; Müller, 2009; Pereira Coutinho, 2016; Wolf, 2005). Another issue concerning measurement of Muslim religiosity is that studies have adapted religiosity scales designed for Christianity or other religions, or used very generic tools to Muslim religions (Abu-Rayya, Abu-Rayya, & Khalil, 2009; AlMarri, Oei, & Al-Adawi, 2009; Bjorck & Maslim, 2011). These adapted tools have been problematic in implementation as they either measure issues that do not exist in Muslim societies or

include items that are ambiguous in interpretation by participants. Moreover, most of the above cited tools are not designed for specific ages, for example, adolescents.

Growing interest in the religion of Islam and the growing need to understand immigrant health has necessitated the need for new scales to be developed incorporating the Muslim worldview in both Western countries and Muslim countries alike (Achour, Grine, Nor, & MohdYusoff, 2015; Gonzalez, 2011). Scales have thus been developed to measure Muslim religiosity in both Muslim countries (Gonzalez, 2011; Jana-Masri & Priester, 2007; Ji & Ibrahim, 2007) and non-Muslim countries (Abu Raiya et al., 2008).

After an examination of available measures of religiosity, we elected to develop our own religiosity measurement tool for use with Muslim youth living in a predominantly Muslim area, a population for which no specific validated measure of religiosity existed. Although it may be desirable for some purposes to measure religiosity across different religions, the fact that we wanted to focus on this population and quantify the association between religiosity and some behaviours (i.e., smoking) that are at face culturally informed led us to develop a more specific tool.

4.2 El-Menouar’s original and final dimensions of Muslim religiosity

This research used as a framework the five dimensions of religiosity identified by El-Menouar (2014): belief, ritualistic approach, experience, knowledge and secular consequences. A dimension can be defined as an aspect or feature of a situation or a measurable extent of a particular kind. Dimensions of religiosity can therefore be described as ways by which religiosity can be measured. As noted above, El-Menouar based her model on Glock’s (1962) model, which has been very influential, as can be seen by the fact that several scholars have adapted it for their own research (see Table 3) shows such other adaptations.

Table 3. *Glock’s original dimensions and those identified by other scholars in the literature*

Glock’s (1962) original dimensions	Experiential, ideological, ritualistic, intellectual, consequential	
Other scholarly works	Glock & Stark (1965)	Belief, ritual, intellectual, consequential
	Stark & Glock (1968)	Orthodoxy, particularism, ethicalism, ritual, devotional, experience, knowledge, communal, friendship
	Nudelman (1971)	Orthodoxy, experience, devotion, ritualism, communal involvement, friendship, ethicalism
	Faulkner & De Jong (1966)	Belief, experience, ritual, intellectual, consequential
	Marx (1967)	Belief, experience, ritual

El-Menouar’s (2014) adaptation is one of the most recent and involved the development of an Islamic religiosity measurement tool specifically for a Muslim adult population. El-Menouar’s argument for doing so was that Glock’s original five-dimensional model had been used as a framework for a long period of time and hence was better established than subsequent versions. Glock’s model is recognised as one of the core models of religiosity, and it has been tested on a Muslim population, albeit an adult one. Furthermore, El-Menouar’s adaptation was successful in mapping the

original five dimensions to Islam-specific constructs, thereby addressing, in part, the first three problems with Muslim religiosity measurement identified by El-Menouar. The present study extends her work by also adopting a Muslim perspective of religiosity while focusing on Muslim youth instead of adults.

4.2.1 Description of El-Menouar's original dimensions

We now examine the dimensions of adult Muslim religiosity initially considered by El-Menouar in her adaptation of the Glock model, prior to the administration of her survey. These dimensions were belief, ritual, devotion, experience, knowledge, and consequences.

Belief. According to Glock, the dimension of belief (which he calls the “ideological dimension”) “is constituted ... by expectations that the religious person will hold to certain beliefs.” In Islam, belief is encapsulated by the Six Pillars of Faith: belief in Allah, His angels, His divine books, His messengers, the Day of Judgment, and predestination. (Qur'an 4: 136).

Ritual. The ritualistic dimension refers to willingly accepting or embracing all prescribed activities within a specific religion. Such acts happen or are endorsed because they appear as orders in the holy scriptures of a particular religion and are accepted without questioning (Krauss, Hamzah, & Idris, 2007). In Islam this dimension consists of the Five Pillars of Islam: *Al-Shahadah* (declaring that there is no god but Allah and Prophet Mohammad his messenger); Prayer (*Salat*) – the ritual of praying 5 times a day; Almsgiving (*Zakat*) – giving 2.5% of one's financial savings to the poor; Fasting (*Swam*) – refraining from eating or drinking for a period of time one month every year as a mark of self-control; and Pilgrimage (*Hajj*) to Mecca once in one's lifetime (Waardenburg, 2002).

Devotion. El-Menouar (2014) distinguishes two aspects of Glock's original ritualistic dimension. The dimension of devotion is distinct from the dimension of ritual above in that it concerns private and unprescribed expressions of religious fervour, such as personal prayers or recitation of the *basmala*, rather than formalised and prescribed activities.

Experience. Experience in Glock's model refers to specific events undergone by a religious person, who is then able to link the events to some purposeful supernatural powers. Other scholars have defined experience referring to the social expectation that religious individuals have a kind of direct contact to an ultimate reality (Huber & Huber, 2012). El-Menouar (2014) subcategorised experience as confirming or responsive as suggested by Stark (1965), where the former refers to the feeling of God's presence and the latter notes the idea of communicating with or receiving a certain type of communication from God.

Knowledge. According to Waardenburg (2002), being a true Muslim means having the required knowledge of Islam as a religion and a lifestyle. The Qur'an and Sunnah are the main sources from which believers learn the doctrine of their religion. According to Islamic faith, the Qur'an is the direct word of Allah, while the Sunnah is the historical account of Prophet Mohammad's life, deeds and ideology. These two works are reference points for knowledge, in the sense that the religiosity of a Muslim individual can be assessed in part by the breadth of his/her knowledge of the content of Qur'an and of the life and deeds of the Prophet.

Consequence. Finally, there is the dimension of consequence, which relates to the notion that Islam did not arise for the purpose of promoting deism but for that of regulating the daily aspects of the Muslim life (Waardenburg, 2002). The dimension of consequence arises from the level of internal belief of a Muslim faithful in the

dichotomous consequences of certain deeds: heaven or hell, happiness or sadness, punishment or reward. Many aspects of social and individual behaviour under Islamic faith can be attributed to the dimension of consequence, including, for example, sex relations and listening to music, as mentioned by El-Menouar (2014).

4.2.2 Description of El-Menouar's final dimensions

El-Menouar then translated the six original dimensions above into a number of items (also called “indicators”, meaning that they have dichotomous responses) that were included in a survey of a population of Muslims in Germany. The survey data were analysed using principal component analysis, which in effect regrouped the items used to define El-Menouar's original dimensions into new dimensions, excluding two of the original items for reasons of low communality. The resultant dimensions were labelled basic religiosity, central duties, religious experience, religious knowledge, and orthopraxis. Table 4 shows the final dimensions and items proposed by El-Menouar to measure religiosity in Islam, as well as their relationship to the originally proposed dimensions. We include this table for completeness, both because its equivalent does not appear in the original paper and because El-Menouar's final dimensions formed the starting point for the creation of our own tool. We describe El-Menouar's final dimensions below.

Basic religiosity. According to El-Menouar's model, the dimension of basic religiosity contains the interrelated dimensions of belief and devotional practice as well as confirming religious experience. The first two items cannot be easily separated from one another, considering that while belief is connected to agreement to the presence of Allah, the individual demonstrates this through the prayers to Allah outside the formalised ritual actions and activities.

Central duties. The dimension of central religious duties contains some of the Pillars of Islam attached to the basic formalities of performance of the ritual prayer, fasting during the holy month, pilgrimage to Mecca, and observance of dietary rules. The three underlying aspects work in synchrony in accordance with the individual level (Pillars of Islam) and the social level (observance of dietary rules).

Religious experience. The dimension of religious experience contains the aspects of responsive religious experience described earlier in terms of spiritual communication with the divine. This includes the feeling that Allah exists, as well as the concepts of punishment and reward.

Religious knowledge. The dimension of religious knowledge concerns the quantification of the knowledge of Islam possessed by the individual. Such knowledge specifically relates to the content of Qur'an and the life and actions of Prophet Mohammad (Sunnah).

Orthopraxis. The orthopraxis dimension contains sex relations (sex segregation, avoidance of hand shaking), and avoidance of listening to music. It refers to the belief that righteous action is as important as religious faith.

Table 4. *Glock's dimension and El-Menouar's final dimensions of Islamic religiosity*

Original (Glock's) dimension	Final dimension	Final subdimension	Code	Item
Belief	Basic Religiosity	Belief	B1	Belief in Allah.
			B2	Belief in the Qur'an as the unchanged revelation.
			B3	Belief in the existence of Jinn, Angels etc.
Devotion	Basic Religiosity	Devotion	D1	Frequency of personal prayer to Allah (<i>dua</i>).
Experience 1			D2	Frequency of recitation of the <i>Basmala</i>
		Confirming religious experience	EC1	Feeling the presence of Allah.
Ritual 1	Central Religious Duties	Ritual	R1	Frequency of ritual prayer performance.
			R2	Pilgrimage to Mecca.
			R3	Fasting during Ramadan.
Consequences 1		Consequences / observance of dietary rules	C1	Drinking alcohol.
			C2	Eating <i>halal</i> meat.
Experience 2	Religious Experience	Responsive religious experience	ER1	Feeling: Allah tells you something.
			ER2	Feeling: Allah is rewarding you.
			ER3	Feeling: Allah is punishing you.
Knowledge	Religious Knowledge	Knowledge	K1	Knowledge of Islam in general.
			K2	Knowledge of the contents of the Qur'an.
			K3	Knowledge of the life and actions of the prophet.
Consequences 2	Orthopraxis	Consequences / religious norms	C3	Avoiding shaking hands with opposite sex
			C4	Sex segregation at marriages and other celebrations.
			C5	Muslims should not listen to music.
Ritual 2	<i>Not retained for measurement of Muslim religiosity</i>		R4	Celebrating the end of Ramadan
Consequences 3			C6	Religious donation (<i>zakat</i>)

4.3 Development of a measurement tool for religiosity in Muslim children

Considering the descriptions of these dimensions, one may wonder at their applicability to a non-adult population. Both Glock and El-Menouar developed their models of religiosity for an adult population and hence they need to be adapted to suit a survey that can be used with Muslim children.

The development of the novel tool in this research mirrored El-Menouar's (2014) approach. We used El-Menouar's final dimensions as my initial ones, then selected facets to populate them, adapting them to Muslim youth. (For reasons of convenience, we broadened the notion of an "item" to what we call a "facet", which can correspond to a single item or to a group of thematically related items or indicators.) Each facet yielded an item or a set of items to form a questionnaire. We administered the questionnaire to Muslim primary school students, as described in Chapter 3, and carried out EFA to identify possible changes to the dimensional structure and item set of the tool. We also carried out reliability analyses on the factors thus identified (in the form of internal consistency analysis) and then performed criterion validity analyses of the scores against anchor questions.

4.3.1 Initial facet selection

The adaptation of El-Menouar's final dimensions to a population of Muslim children was carried out by excluding some facets for lack of relevance or applicability and including new facets with reasonable face validity (after consultation with experts) in an effort to capture elements of religiosity relevant to Muslim children and to the dimensions. To produce the measurement tool, each facet was then translated into a single question or, in the case of the religious knowledge dimension, groups of questions.

4.3.2 Excluded facets

4.3.2.1 Exclusions in central religious duties dimension

In El-Menouar's dimension of central religious duties, the pilgrimage to Mecca was excluded because it is not imposed on children at this age. Similarly, the facets of drinking alcohol and eating *halal* were excluded due to their inappropriateness to children at the age surveyed. Furthermore, cultural sensitivities in an Islamic society regarding these issues needed to be respected.

4.3.2.2 Exclusions in orthopraxis dimension

With the sex relation facets (i.e., avoiding shaking hands with opposite sex, and segregation at marriages and other celebrations) were excluded. The facet concerning listening to music was also excluded due to its irrelevance to children at the chosen age range – the *haram* only applies to adults. Even with adults there are different interpretations, with some Muslim elders considering it *haram*, others as *makruh* according to *fatwa*. According to prophet Mohammad (PBUH), “There are three whose actions are not recorded: a lunatic whose mind is deranged till he is restored to consciousness, a sleeper till he awakes, and a boy till he reaches puberty?” (Sunnah.com, n.d.-h). Another justification was that these facets do not appear within the school curriculum for Islamic education material for the grades 1–4 (Jordanian Ministry of Education, 2006, 2007, 2008a, 2008b).

4.3.3 Newly included facets

On the basis of the description of El-Menouar's final dimensions and the expected exposure to and experience of these dimensions among children 10–12 years of age, we included a number of new facets (see Table 5) to be validated in order to refine the model for its intended purpose. The facets added were as follows.

4.3.3.1 Inclusions in the basic religiosity dimension

This dimension consists of the subdimensions of belief, devotion, and confirming religious experience. The subdimension of belief retains the facets of belief in the existence of Allah (B1); Belief in the Qur'an that is revealed from Allah (B2); and Belief in the existence of Jinn and Angels (B3) from El-Menouar's model because they are applicable to school-age children. Belief in the Qur'an includes belief in the writing of the sacred books (Qur'an, Bible, Psalms and Torah) as well as the belief that these were revealed by Allah. We added, under this subdimension, Belief in all the prophets and messengers of Allah (B4*); Belief in the sacred texts revealed to the prophets (B5*); Belief in the Day of Judgment (B6*); and Belief in predestination (*Qada* and *Qadar* – B7*). Those facets form what are called the Articles of Faith in Islam, to which B5* was added. Facets B4* to B7* were added to the subdimension considering the exposure of Muslim children to the Articles of Faith provided by the Jordanian religious curriculum for grades 1–4 (Jordanian Ministry of Education, 2006, 2007, 2008a, 2008b).

In the devotion subdimension, we retained the facets of Frequency of the personal prayer to Allah (referring to the activity of *Dua'a* – D1) and Frequency of recitation of the *Basmala* (D2) because of their applicability to children. In addition, we added the following facets to the devotion subdimension: Frequency of prayer in the congregation (D3*); Frequency of voluntary fasting (D4*); Frequency of attendance

at Qur'an memorisation centres (D5*); and Frequency of attendance at religious lessons (D6*). These were included because they are devotional activities which children in this age range are familiar with at school (e.g., attendance at “lessons” and “memorisation” are very similar to school routines) (Tudge & Rogoff, 1999). They are considered devotional activities because outside the school life the frequency of involvement depends on the student's devotion. We note the importance of regularity and frequency in this subdimension.

In the confirming religious experience subdimension, we included Feeling the presence of Allah (EC1) as taken from El-Menouar (2014). According to El-Menouar (2014), the full confirmation of the presence of Allah represents the core of the Islamic belief. The new facets added here were Praising Allah in weal and woe (EC2*); Resorting to Allah in times of difficulty (EC3*); and Resorting to Allah in times of prosperity (EC4*). Facets EC2*–EC4* denote behaviours rather than the subjective feelings regarding the presence and agency of Allah targeted by this subdimension. However, the enactment of these behaviours depends on the strength of these feelings, based upon the advice we received (see Appendix K), and in all cases applies to children as well as adults.

4.3.3.2 Inclusions in the central religious duties dimension

The investigator included facets corresponding to some of the Pillars of Islam, and in particular followed El-Menouar's inclusion of Frequency of ritual prayer performance (R1) and Frequency of fasting during Ramadan (R3) among the facets of the dimension. Additionally, Frequency of timely performance of ritual prayers (R2*) was added to the dimension of central duties.

By the age of 9 children have been exposed to the Pillars of Islam within the curriculum (Jordanian Ministry of Education, 2006, 2007, 2008a, 2008b). However,

children only practise *Shahada* (declaration of faith), *Salat* (ritual prayer) and *Sawm* (fasting). In Islam parents are required to start to teach their children religious rituals, particularly prayers (*Salah*), as early as age 7. For example, the Prophet Muhammad (PBUH) said, “Command your children to pray when they become seven years old and beat them for it (prayer) when they become ten years” (Sunnah.com, n.d.-g). It is obligatory for children when they attain puberty.

As for fasting, this activity (ritual) is not obligatory for young children until they reach puberty (Islam Question and Answer, n.d.). It is stated by scholars that parents should command their children from the age of 7 to fast in order to train them in this ritual. When they attain puberty, fasting becomes obligatory (Islamweb).

We note that El-Menouar excluded mosque attendance from her original ritual dimension because, in accordance with Islamic doctrine, expectations regarding mosque attendance differ by sex (Qur'an 24: 31). Mosque attendance is not integral to Islamic ritual itself but is, rather, suggested, and hence an option (Rippin, 2005). For these reasons, and because the religiosity measurement tool is intended to be used with both male and female children, mosque attendance was not included as a facet of central religious duties.

4.3.3.3 Inclusion in the religious experience dimension

With respect to this dimension, the investigator followed the items of El-Menouar (2014) and Stark and Glock (1968), who both contend that confirming religious experience and responsive religious experience should be separated. The three facets proposed by El-Menouar were retained to compose this dimension, encompassing aspects of communicating with, being rewarded by, and being punished by Allah. The overall notion in the measurement is the concept of subjective feeling and can be verbalised as “I feel that Allah watches me at all times” (ER1); “I feel that Allah

rewards me for my good deeds” (ER2); and “I feel that Allah punishes me for my bad deeds” (ER3). These facets were considered suitable for children, based on the expert advice received (see section 3.2.3).

4.3.3.4 Inclusions in the religious knowledge dimension

The investigator in the current dimension also broadly followed El-Menouar’s articulation of religious knowledge, who adapted hers from Glock (1962). El-Menouar used 3 items and these were by self-assessment. The items of religious knowledge include knowledge of the contents of the Qur’an, general knowledge of Islam, and knowledge of the life and actions of Prophet Mohammad (PBUH).

From the point of view of implementation, the original facets of the religious knowledge dimension were each translated into a single subdimension involving self-rating of the respondent in the corresponding domain of knowledge. Rather than taking this approach, we created 3 subdimensions (four new items per subdimension) to verify knowledge. The items were taken from the curriculum that is offered in grades 1–4 (Jordanian Ministry of Education, 2006, 2007, 2008a, 2008b). Questions related to religiosity knowledge which were scored in the questionnaire by selecting the correct answer from a list of five alternatives were further dichotomised by correctness of answer.

4.3.3.5 Inclusions in the orthopraxis dimension

The dimension of orthopraxis was so named by El-Menouar because the facets it retained (involving sex relations and attitude to music) could be identified as reflecting the level of orthodoxy of the respondent. She broadened the compass of this dimension by evoking “the degree to which Islam structures the everyday life of believers beyond the standardized religious rituals”. we have selected new facets for the orthopraxis

dimension reflecting observance of strict religious norms and selected from the children's school curriculum in the previous years (Jordanian Ministry of Education, 2006, 2007, 2008a, 2008b). These new facets are Obedience to parents (O1*); Helping others (O2*); Performing duties honestly and conscientiously (O3*); Telling the truth in various situations (O4*); Performing deeds corresponding to one's words (O5*); Asking others before borrowing their things (O6*); and Avoiding cheating when dealing with others (O7*). My initially proposed facets are summarised in Table 5.

Table 5. *Proposed composition of religiosity dimensions in Muslim children*

El-Menouar's final dimensions	Subdimension (based on El-Menouar's original dimensions)	Code	Facet
Basic religiosity	Belief	B1	Belief in the existence of Allah.
		B2	Belief in the Qur'an that is revealed from Allah.
		B3	Belief in the existence of Angels and Jinn.
		B4*	Belief in all the Prophets and messengers of Allah.
		B5*	Belief in the sacred texts that were revealed to the Prophets.
		B6*	Belief in the Day of Judgment.
		B7*	Belief in fate and destiny (Predestination).
	Devotion	D1	Frequency of personal prayer to Allah (<i>dua</i>)
		D2	Frequency of recitation of the <i>Basmala</i> .
		D3*	Frequency of prayer in the congregation.
		D4*	Frequency of voluntary fasting.
		D5*	Frequency of attendance at Qur'an memorisation centres.
		D6*	Frequency of attendance at religious lessons.
Confirming religious experience	EC1	Feeling the presence of Allah.	
	EC2*	Praising Allah in weal and woe.	
	EC3*	Resorting to Allah in times of difficulty.	
	EC4*	Resorting to Allah in times of prosperity.	
Central duties	Ritual prayer	R1	Frequency of ritual prayer performance.
		R2*	Frequency of performing the obligatory prayers on time.
	Fasting during Ramadan	R3	Frequency of fasting during Ramadan.
Orthopraxis	Not applicable	O1*	Obedience to parents.
		O2*	Helping others.
		O3*	Performing duties honestly and conscientiously.
		O4*	Telling the truth in various situations.
		O5*	Performing deeds corresponding to one's words.
		O6*	Asking others before borrowing their things.
		O7*	Avoiding cheating when dealing with others.
Experience	Responsive religious experience	ER1	Feeling: Allah is watching you at all times.
		ER2	Feeling: Allah is rewarding you.
		ER3	Feeling: Allah is punishing you.
Knowledge	Not applicable	KQ1*; KQ2*; KQ3*; KQ4*	Knowledge of the contents of the Qur'an.
		KI1*; KI2*; KI3*; KI4*	Knowledge of Islam in general.
		KP1*; KP2*; KP3*; KP4*	Knowledge of the life and actions of Prophet Mohammad.

Notes. 1. * indicates a facet not present in El-Menouar's model. The asterisk will be retained throughout this work to identify children-specific facets and items.

2. Excludes pilgrimage to Mecca (originally R2) and observance of dietary rules (originally C1, C2).

3. Excludes sex relations (originally C3, C4) and avoidance of music (C5).

4.3.4 Facet evaluation and adaptation procedures

In order to evaluate the proposed facets within their dimension, several sources of information were utilised. We consulted the relevant literature (Alzyoud et al., 2015; Cornwall, Albrecht, Cunningham, & Pitcher, 1986; El-Menouar, 2014; Glock, 1962) and found that there were deficiencies in terms of accommodating Muslim children's religiosity. There were also deficiencies in terms of coverage of children in a specific Jordanian context. Triangulation also included document review, for example the Jordanian Ministry of Education's religious curriculum for grades 1–4 (Jordanian Ministry of Education, 2006, 2007, 2008a, 2008b). Advice was obtained from Islamic academic experts from the faculty of Al-Sharee'a and Islamic Studies in Jordanian universities (see Appendix K). Additionally, advice from the Muslim religious advisor (named Sheikh Rafat Najm) at AUT was sought by the investigator (Chaplains at AUT, 2015). This personal communication was aimed at identifying any doctrinally imposed duties and behaviours in children at the age being researched.

Additional consultation was also undertaken with academics in education and religious studies in Jordan to further refine the facets and to shape them into questionnaire items. In addition to Dr Nihaya A. Al-Sheyab (co-supervisor) and Dr Khalid A Kheirallah (advisor), consultation was undertaken with 18 other academics at Jordan University of Science and Technology and Yarmouk University in the areas of Islamic studies, educational psychology, education, public health and medicine (see Appendix K). In addition, the investigator held discussions with representatives of the Ministry of Education in Jordan to understand the contents of the school curriculum in religious education for children between 9 and 13.

4.4 Religiosity statistical analysis

The development of the religiosity measurement tool for Muslim children was based on a psychometric analysis of the baseline data collected on religiosity items laid out in a questionnaire administered to measure the association between religiosity and smoking among Muslim youths. We refer to the initial tool as the “working instrument” as it was developed prior to data collection. This religiosity scale was then calibrated using the 2015 data presented in Chapter 5. The statistical analyses in this chapter were performed using SAS version 9.4 (copyright 2002-2012). Structural analyses were carried out according to the following plan.

A Pearson correlation matrix was computed using the self-assessment scale scores for religiosity. Each matrix was factored using EFA, which was conducted on the working instrument using the 2015 data, to assess the need to remove items as well as the need to aggregate existing dimensions from the working instrument and/or to introduce new ones. There were only a few questions with missing data in the religiosity section as shown in Table 6, therefore there was no need for multiple imputation.

Table 6. *Religiosity survey missing data frequencies*

Questions	Items in 2015	Freq. Missing
Q11	I believe in the existence of Allah	1
Q14	I believe in all the Prophets and messengers of Allah.	1
Q25	I Praise Allah in weal and woe.	2
Q26	I resorted to Allah in difficulty times.	1
Q27	I resorted to Allah in prosperity times.	1
Q29	I perform the obligatory prayers on time.	1

EFA was carried out using maximum likelihood estimation and oblimin rotation (Conway & Huffcutt, 2003). The value of 0.40 was used as a factor loading threshold to determine whether an item belonged to a particular factor. An item with multiple

loadings larger than 0.40 was considered a cross-loaded item. Any cross-loaded item was assigned to the factor in which it held the largest loading in the study. The number of factors retained was determined on the basis of a critical appraisal of several criteria, including consistency of the estimated factor structure with the posited model, proportion of variance explained by each factor, Akaike's information criterion (AIC), and absence or scarcity of cross-loaded items. Items that did not reach the threshold on any of the factors were removed from score computation, as described below. The retained factors were examined and identified; a score was created for each of the factors retained by summing the individual item responses and standardising the result to take on values between 0 and 10, to facilitate comparisons. Pearson correlations between factor scores were examined, with a view to ascertaining whether the correlations were sufficiently modest to justify the selected number of factors as well as factor structure.

The scores were examined for reliability via internal consistency. The internal consistency of each item was assessed using Cronbach's α on standardised items within each retained factor as well as overall. An α coefficient larger than 0.7 was considered as demonstrating high internal consistency and hence the reliability of the scale.

Spearman correlations between similar scores in 2015 and the 1-year follow-up in 2016 were produced. In this instance, the purpose was not to examine reliability per se, since strong changes in religiosity within 1 year cannot be excluded in children of this age, but to ensure that the strongest correlations occurred between similar scores across the 2 years.

Finally, the scores were also examined for convergent validity by regressing three dichotomised anchor questions (How religious do you think your parents are? How

would you assess yourself religiously? How important are religious rules in your daily life?) on the retained factor scores, using simple as well as multiple logistic regression. We set a threshold of 0.05 on the observed two-sided significance, as well as an odds ratio (OR) estimate larger than 1 to declare a significant positive association. We elected not to account for multiple testing in our approach, but the observed significance levels are provided and the reader may make appropriate adjustments if desired.

For the purpose of assessing the strength of the associations, we followed the approach of Chen, Cohen and Chen (2010), who used baseline prevalence to translate values of Cohen's effect size d into ORs (Cohen, 1988). Briefly, we carried out the inverse operation, obtaining the standard normal quantile Z_0 from the prevalence implied by the estimated odds at a factor score of 10 (the mode and the maximum in all cases) and the standard normal quantile Z from the prevalence implied by a factor score of 10 minus one standard deviation (SD) of the factor score, and then computing $d = Z_0 - Z$. The 95% confidence intervals (CIs) for the d values were computed conditionally on the estimated odds at a factor score of 10 and using the OR confidence bounds instead of the OR estimates.

Final tool development was informed by all of the above in conjunction with the conclusions of El-Menouar (2014) and other relevant literature sources on measuring Muslim religiosity (Huber & Huber, 2012; Ji & Ibrahim, 2007; Khraim, 2010; J. E. King & Crowther, 2004; Krauss et al., 2007).

4.5 Results

4.5.1 Exploratory Factor Analysis (EFA)

The Pearson correlation matrix of the items was estimated and three items were removed from the scale at this stage as they caused the estimated matrix to be singular.

The items removed were B6 (Belief in the Day of Judgment); KQ1 (Whose words are the holy Qur'an's?); and KI4 (At what time is Friday prayer done?).

EFA with non-orthogonal rotation (oblimin) was performed in order to determine the dimensional structure of the items. A direct oblimin rotation was chosen as there was no reason to believe a priori that the factors were uncorrelated. Bartlett's test of sphericity was used to evaluate the appropriateness of the factor analysis. Throughout the process of EFA items were deleted that did not load properly on a particular factor (<0.40).

Table 7 shows the component loadings of the items on the single dimensions. It was found that 14 items of religiosity for Muslim students loaded strongly on factor 1 from the rotated factor pattern result. Eight items loaded strongly on factor 2, six items on factor 3, and seven items on factor 4. Four items in the resulting model loaded less than 0.40 on all four factors and they were therefore excluded: D4 (Frequency of voluntary fasting); KI2 (How often must pilgrimage take place?); KP3 (How old was Prophet Mohammed at the time of revelation?); and R3 (Frequency of fasting during Ramadan). These items also had low communalities ranging from 0.04 to 0.41.

A communality is the extent to which an item correlates with all other items and indicates the variance in each item explained by the extracted factors. In the results analysis higher communalities are selected for inclusion depending on a stated criterion. Item communalities are considered "high" if they are all 0.8 or greater

(Velicer & Fava, 1998), but this is unlikely to occur in real data. More common magnitudes in the social sciences are low to moderate communalities of .40 to .70. If an item has a communality of less than .40, it may either (a) not be related to the other items or (b) suggest an additional factor that should be explored (Costello & Osborne, 2005). The final communality estimates show that all the variables are well accounted for by four factors, with final communality estimates five items had an EFA loading greater than 0.40 and a communality less than 0.40 (O2, KQ4, KP4, D5, D2) ranging from 0.39 to 0.80 for Experience & Orthopraxis (1 item less than 0.40); from 0.18 to 0.70 for Knowledge (2 items less than 0.40); from 0.54 to 0.88 for Belief; and from 0.28 to 0.52 for Devotion & Practice (2 items less than 0.40).

Thus, of the 42 original religiosity items, 35 were retained. They all had loadings greater than 0.40 on one of the four factors, with no cross-loading. Rotated factor loadings for the final model are presented in Table 7. An a priori naming strategy for factors was used to identify their top one or two loading items and their relationship to known religiosity models. As it happens, the original and final dimensions of El-Menouar's model mapped fairly clearly onto the factors, and provided natural labels describing the underlying constructs, as recommended by Morrison and Morrison (2003).

Table 7 shows that the 14 items with high loading on factor 1 concerned both confirming and responsive religious experience, as well as orthopraxis. Hence factor 1 was named "Experience & Orthopraxis". Eight items loaded above 0.40 on factor 2 and they consisted of all the remaining knowledge items, hence the name "Knowledge" for factor 2. The six remaining belief items all loaded above 0.40 on factor 3, which was named "Belief". The remaining two ritual and five devotional

items loaded high on factor 4, although the largest loading on this factor did not reach as high a value as in the other three. We named factor 4 “Devotion & Practice”.

Table 7. Rotated factor pattern (standardised regression coefficients) for dependence items among Muslim students based on data in 2015 (N=926)

Items	Factors			
	Experience & Orthopraxis	Knowledge	Belief	Devotion & Practice
	Factor1	Factor2	Factor3	Factor4
ER1	0.85			
ER2	0.69			
O6	0.67			
O7	0.66			
O5	0.62			
EC2	0.61			
O4	0.60			0.33
O3	0.60			
ER3	0.59			
EC4	0.50			0.32
O1	0.48			
EC1	0.47		0.33	
EC3	0.45			
O2	0.41			0.31
KI3		0.83		
KQ3		0.76		
KI1		0.75		
KP1		0.71		
KP2	0.31	0.71		
KQ2		0.68		
KP4		0.53		
KQ4		0.45		
B4			0.83	
B2			0.83	
B3			0.77	
B5			0.77	
B1			0.73	
B7			0.58	
D1				0.67
D3				0.67
R1				0.63
R2				0.59
D6				0.54
D5				0.50
D2				0.43
D4	0.38			
KI2		0.36		
KP3		0.19		
R3	0.30			0.34

Table 8 presents the final proposed four dimensional religiosity measurement tool for Muslim children.

Table 8. *The four factors of Muslim children religiosity*

El-Menouar's Final Dimension	Sub-Dimension (based on El-Menouar's original dimensions)	Factors in new model	Code	Item
Basic religiosity	Confirming religious experience	Experience & Orthopraxis	EC1	Feeling the presence of Allah.
	Experience		Responsive religious experience	EC2*
EC3*				Resorting to Allah in times of difficulty.
Orthopraxis	Not applicable		EC4*	Resorting to Allah in times of prosperity.
			ER1	Feeling: Allah is watching you at all times.
			ER2	Feeling: Allah is rewarding you.
			ER3	Feeling: Allah is punishing you.
			O1*	Obedience to parents.
			O2*	Helping others.
			O3*	Performing duties honestly and conscientiously.
Knowledge	Not applicable	O4*	Telling the truth in various situations.	
		O5*	Performing deeds corresponding to one's words.	
		O6*	Asking others before borrowing their things.	
		O7*	Avoiding cheating when dealing with others.	
		KQ2*	By whom is the Quran revealed?	
		KQ3*	On whom is the Quran revealed?	
		KQ4*	In what month was the Quran revealed?	
		KI1*	Who knows the date of the Day of Judgement?	
Basic religiosity	Belief	Belief	KI3*	To whom is Zakat given?
			KP1*	Who is the last prophet sent by Allah?
			KP2*	What was the Prophet's occupation?
			KP4*	To whom was sent the Prophet?
			B1	Belief in the existence of Allah.
			B2	Belief in the Quran that is revealed from Allah.
			B3	Belief in the existence of Angels and Jinn.
Basic religiosity	Devotion	Devotion & Practice	B4*	Belief in all the Prophets and messengers of Allah.
			B5*	Belief in the sacred texts that were revealed to the Prophets.
			B7*	Belief in fate and destiny (Predestination).
			D1	Frequency of personal prayer to Allah (dua)
			D2	Frequency of recitation of the Basmala.
Central duties	Ritual prayer	Devotion & Practice	D3*	Frequency of prayer in the congregation.
			D5*	Frequency of attendance at Quran memorisation centres.
Basic religiosity	Belief Devotion	Devotion & Practice	D6*	Frequency of attendance at religious lessons.
			R1	Frequency of ritual prayer performance.
Central duties	Fasting during Ramadan	Devotion & Practice	R2*	Frequency of performing the obligatory prayers on time.
			B6*	Belief in the Day of Judgment.
Knowledge	Not applicable	Not retained for measurement of Muslim children religiosity	D4*	Frequency of voluntary fasting.
			R3	Frequency of fasting during Ramadan.
			KQ1*	The Quran is the word of ...
			KI2*	Frequency of pilgrimage
			KI4*	When is Friday prayer done?
Knowledge	Not applicable	Not retained for measurement of Muslim children religiosity	KI3*	How old was the Prophet at the time of revelation?
			KP3*	How old was the Prophet at the time of revelation?

Note. * indicates a facet not present in El-Menouar's model.

4.5.1.1 Correlations between the four factors

The correlations between the four factors among Muslim students is shown in Table 9. Knowledge correlated poorly with the other three factors. Experience & Orthopraxis correlated marginally with Devotion & Practice and moderately with Belief. Belief correlated with Devotion & Practice at a low-to-marginal level. These modest correlations can be interpreted as corroborating the hypothesis that the factors are distinct from each other and form separate dimensions.

Table 9. *Correlations between the four factors among Muslim students based on data in 2015 (N=926) (interfactor correlations)*

Factors	Knowledge	Belief	Devotion & Practice
Experience & Orthopraxis	0.16	0.52	0.40
Knowledge		0.17	-0.17
Belief			0.22

4.5.2 Reliability

Reliability analysis (i.e., Cronbach's α) of the extracted four factors was then conducted. The values of Cronbach's α for the four religiosity scores are shown in Tables 10-13. The values of the α coefficients were satisfactory, ranging from moderate ($\alpha=0.688$) to high ($\alpha=0.839$).

4.5.2.1 Experience & Orthopraxis (Factor 1)

The Experience & Orthopraxis factor had a Cronbach's α value of 0.839 for standardised variables in 2015, as shown in Table 10. The deleted-item α coefficients are all smaller than or equal to this value, ranging from 0.823 to 0.839, indicating that all items should be retained. In terms of correlating with the total there was no item that correlated at less than $r=0.30$, and hence all items were kept. Table 10 also shows that there are differences of only 0.01 between the α in the raw variables and α in standard variables.

Table 10. Internal consistency analysis for the Experience & Orthopraxis factor based on 2015 data

Cronbach's α coefficients of if variable deleted		
Deleted Variable	Standardised variables	
	Correlation with factor	α
EC1	0.420	0.833
EC2	0.576	0.823
EC3	0.447	0.831
EC4	0.512	0.827
O1	0.440	0.832
O2	0.429	0.832
O3	0.527	0.826
O4	0.501	0.828
O5	0.493	0.828
O6	0.492	0.828
O7	0.459	0.830
ER1	0.537	0.825
ER2	0.493	0.828
ER3	0.328	0.839

4.5.2.2 Knowledge (Factor 2)

Knowledge had a Cronbach's α of 0.736 for standardised variables. When individual variables are deleted the coefficient values range from 0.688 to 0.746 for individual standardised items, as shown in Table 11.

Table 11. *Internal consistency analysis for the Knowledge factor based on 2015 data*

Cronbach's α coefficients of if variable deleted		
Deleted Variable	Standardised variables	
	Correlation with factor	α
KQ2	0.452	0.704
KQ3	0.490	0.697
KQ4	0.331	0.746
KI1	0.447	0.705
KI3	0.532	0.688
KP1	0.462	0.702
KP2	0.471	0.701
KP4	0.352	0.724

4.5.2.3 Belief (Factor 3)

Belief had a Cronbach's α of 0.817 for standardised variables, as shown in Table 12. When individual variables are deleted the coefficients are satisfactory, ranging from 0.765 to 0.808 for individual standardised items. If individual variables are deleted, all 6 items had $\alpha=0.765$ or higher, showing the factor to be reliable. All items result in a decrease of α when deleted. No item had a correlation with the factor smaller than 0.30 and hence all items were kept.

Table 12. *Internal consistency analysis for the Belief factor based on 2015 data*

Cronbach's α C coefficients of if variable deleted		
Deleted Variable	Standardised variables	
	Correlation with factor	α
B1	0.537	0.797
B2	0.683	0.765
B3	0.486	0.808
B4	0.665	0.769
B5	0.613	0.781
B7	0.505	0.804

4.5.2.4 Devotion & Practice (Factor 4)

Devotion & Practice had a Cronbach's α of 0.773 for standardised variables, as shown in Table 13. When individual variables are deleted the coefficients remain satisfactory, ranging from 0.733 to 0.765 for individual standardised items, showing the factor to be reliable. All items resulted in a decrease in the α when deleted. No item had a correlation with the factor smaller than 0.30 and hence all were retained.

Table 13. *Internal consistency analysis for the Devotion & Practice factor based on 2015 data*

Cronbach's α coefficients of if variable deleted		
Deleted Variable	Standardised variables	
	Correlation with factor	α
D2	0.388	0.765
D1	0.573	0.728
D3	0.550	0.733
D5	0.415	0.760
D6	0.505	0.742
R1	0.525	0.738
R2	0.503	0.742

4.5.3 Factor correlations 1 year apart

As a supplementary validity check, we estimated the correlations between all pairs of factors in both 2015 and 2016. There is no reason to believe that factor values would not change in one year among the age group considered, but we hypothesised that under a valid tool the correlation of a factor with itself across the years would be positive and have larger magnitude than the correlation with the other factors.

In order to measure the stability over year of the scale and to discover the strength of a link between two sets of data, the Spearman correlation coefficients of all pairs of religiosity factors between 2015 and 2016 are shown in Table 14. From year to year, the Knowledge factor displayed the strongest between-year correlation, followed by the Devotion & Practice factor. In addition, a significant positive correlation was found in the Experience & Orthopraxis factor between 2015 and 2016, and similarly for the Belief factor in 2016. The same-factor correlations between years are all larger than the distinct-factor correlations, corroborating our hypothesis regarding factor correlations across years.

Table 14. *Correlations between individual factors for the religiosity between two years (2015 and 2016)*

Spearman correlation coefficients $p > r $ under $H_0: \rho=0$				
Number of valid observations				
Factors (2015)	Factors (2016)			
	Experience & Orthopraxis	Knowledge	Belief	Devotion & Practice
Experience & Orthopraxis	0.31	0.03	0.18	0.24
	<.0001	0.50	<.0001	<.0001
Knowledge	571	667	624	582
	0.08	0.49	0.21	-0.01
Belief	0.07	<.0001	<.0001	0.85
	573	669	626	584
Devotion & Practice	0.14	0.09	0.27	0.10
	0.001	0.02	<.0001	0.02
Experience & Orthopraxis	572	668	625	583
	0.20	-0.15	0.03	0.43
Knowledge	<.0001	0.0001	0.49	<.0001
	573	669	626	584

4.5.4 Convergent validity

In order to assess the convergent validity of the factors, the associations between the religiosity factors and three anchor questions were evaluated. We chose to examine this aspect of validity in the 2016 data instead of the 2015 data, as the introduction of new independent observations and the time lag gave the 2016 data some distance from the original calibration data.

The three anchor questions we examined were:

- Q53: How would you assess yourself religiously?
- Q54: How religious do you think your parents are?
- Q55: How important are religious rules in your daily life?

The possible answers were: Not religious at all/Rather not religious/Rather religious/Very religious for Q53 and Q54, and Not important at all/Rather not important/Rather important/Very important for Q55.

The anchor questions were chosen for two reasons. Firstly these questions needed to capture the fact that religiosity at the age being researched is a product of parental influence (Q54); the child’s own self-reflection (Q53); and what the child actually does (Q55). Secondly, we chose the anchor questions based on our knowledge of the fact that the people being researched are minors (especially Q54).

The distribution of the responses (see Table 15) made it desirable to dichotomise the responses into not very-religious/Very religious for Q53 and Q54; and Not very important/Very important for Q55.

Table 15. *Distributions of responses for anchor questions 53, 54 and 55 in 2016*

Response Q53 & Q54 / Q55	Q53		Q54		Q55	
	Freq.	%	Freq.	%	Freq.	%
Not religious at all/Not important at all	37	4%	32	4%	19	2%
Rather not religious/Rather not important	91	11%	50	6%	29	3%
Rather religious/Rather important	278	33%	119	14%	194	23%
Very religious/Very important	436	52%	643	76%	603	71%

After establishing the four religiosity factors, we hypothesised that all three questions would be positively associated with each of the four factors severally. Although we carried out an adjusted analysis, it was exploratory in nature and we did not formulate hypotheses a priori.

The logistic regression results are shown in Table 16. The unadjusted ORs corroborate our hypotheses regarding convergent validity, except in the case of Knowledge and self-assessment of religiosity; in all other cases, the unadjusted odds ratio reaches statistical significance and is larger than one. The strongest significances are achieved

by Experience & Orthopraxis and Devotion & Practice across all anchor questions; strength of association is examined below.

The adjusted analyses demonstrate a loss of significance across all factors and anchor questions, as could be expected from the generally positive correlation between factors. In particular, it appears that the association of Belief with Experience & Orthopraxis, as displayed in Table 16, is mainly responsible for the significance of its unadjusted ORs with the anchors, as this significance vanishes under adjustment. The only significant ORs to change appreciably under adjustment are those of Experience & Orthopraxis, which decrease for all three anchors. This decrease is consistent with the moderate to strong correlation between this factor and both Belief and Devotion & Practice.

Table 16. ORs, unadjusted and adjusted for all four factors, between factors of religiosity and three anchor questions in 2016

Factors	Anchor questions in 2016																	
	Q53 How would you assess yourself religiously? ("Very religious" vs "Not very religious")						Q54 How religious do you think your parents are? ("Very religious" vs "Not very religious")						Q55 How important are religious rules in your daily life? ("Very important" vs "Not very important")					
	Unadjusted OR			Adjusted OR			Unadjusted OR			Adjusted OR			Unadjusted OR			Adjusted OR		
	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value	OR	95% CI	p-value
Experience & Orthopraxis	1.71	(1.42,2.07)	<.0001	1.24	(0.97,1.58)	0.09	1.55	(1.30,1.85)	<.0001	1.20	(0.93,1.54)	0.15	2.03	(1.68,2.45)	<.0001	1.55	(1.20,2.00)	0.0008
Knowledge	0.99	(0.92,1.05)	0.65	1.03	(0.93,1.13)	0.60	1.12	(1.04,1.26)	0.003	1.11	(1.00,1.22)	0.04	1.13	(1.05,1.21)	0.0007	1.11	(1.01,1.23)	0.04
Belief	1.19	(1.02,1.38)	0.02	0.89	(0.71,1.13)	0.34	1.33	(1.14,1.55)	0.0004	1.08	(0.85,1.37)	0.52	1.42	(1.21,1.65)	<.0001	1.12	(0.88,1.42)	0.35
Devotion & Practice	1.47	(1.35,1.60)	<.0001	1.45	(1.30,1.60)	<.0001	1.24	(1.14,1.34)	<.0001	1.17	(1.06,1.30)	0.003	1.38	(1.27,1.50)	<.0001	1.27	(1.14,1.41)	<.0001

*Significant difference at $p \leq 0.05$ are denoted in bold font; non-significant difference at $p > 0.05$; results adjusted for school cluster effect.

The Cohen's d equivalencies to the unadjusted ORs are shown in Table 17. The anchor values for Cohen's d are usually taken to be 0.2 for a small effect, 0.5 for a moderate effect, and 0.8 for a strong effect (Cohen, 1988).

Table 17. *Estimated Cohen's d -equivalencies to unadjusted ORs*

Factors	Anchor questions in 2016					
	Q53		Q54		Q55	
	How would you assess yourself religiously?		How religious do you think your parents are?		How important are religious rules in your daily life?	
	d	95% CI	d	95% CI	d	95% CI
Experience & Orthopraxis	0.32	(0.20,0.43)	0.27	(0.16,0.37)	0.39	(0.28,0.51)
Knowledge	-0.03	(-0.11,0.06)	0.13	(0.05,0.22)	0.12	(0.03,0.21)
Belief	0.10	(0.01,0.20)	0.18	(0.09,0.28)	0.22	(0.12,0.31)
Devotion & Practice	0.47	(0.37,0.57)	0.23	(0.14,0.33)	0.36	(0.27,0.46)

The Cohen's d -equivalencies show that the effects are strongest in the (Devotion & Practice and Experience & Orthopraxis factors, which were also the most significant ones, and range between small and moderate in size.

4.6 Discussion

In this research we examined the religiosity of pre-adolescents through the development of a religiosity measurement tool for use among Muslim students in a Muslim country (Jordan). The measurement tool was calibrated using 2015 data and validated with 2016. The above analyses provide strong evidence to support the idea that four factors of religiosity exist among Muslim children in Jordan.

This discussion will centre on three main themes: first, the relevance of the sample to our research aim; second, the reliability and validity of the instrument that was developed for this research; and third, the relevance of the factors uncovered and their relationship to the religiosity of Muslim children.

We first make some claims regarding the psychometric soundness of the religiosity scores on the basis of our study population. First, the scores were developed among children of the age they were intended to be used with; we are not importing scales validated in adult populations for use in a potentially unsuitable setting. Secondly, the scores were developed using data from a sample of Muslim people living in a Muslim country; other religiosity scales lack focus on the specificities of the Muslim religion (Halman & Draulans, 2006; Müller, 2009; Pereira Coutinho, 2016; Wolf, 2005) or are based on a sample of Muslim people living in a Western country (Abu Raiya et al., 2008; El-Menouar, 2014), whose levels of religiosity, and indeed constructs of religiosity, may differ from those living in a Muslim country. We may be belabouring an obvious point, but both of these aspects in the selection of our study population bolster the external validity of our measurement scales, bringing us to our third point: our measurement scales are not intended for comparison of religiosity between different groups (such as migrant and non-migrant Muslims), but rather to assess the association between certain behaviours and religiosity in Muslim children living in a

Muslim country. The external validity of our measurements need only extend to this setting.

Next, we summarise our findings regarding reliability and validity. In terms of reliability, the statistics obtained as Cronbach's α coefficients all exceeded 0.7, demonstrating high internal consistency.

Validity was demonstrated by the significance of unadjusted ORs and the association between individual factors of religiosity with three anchor questions in 2016. What stood out was that all factors except Knowledge were significantly and positively associated with self-assessment of religiosity (Q53). We retained Knowledge as a meaningful factor of religiosity nevertheless, because all factors, including Knowledge, were significantly positively associated with the assessment of the parents' religiosity (Q54) and the assessment of the importance of religious rules in daily life (Q55).

Beyond the clearly detected associations displayed Table 16 , it was also important to assess the magnitude of the effects; hence the use Cohen's *d*-equivalencies. The strengths of the associations displayed in the Cohen's *d* equivalencies as well as the adjusted analyses indicate that Devotion & Practice and Experience & Orthopraxis capture religiosity in children more strongly than the other two factors, with Devotion & Practice being the stronger of the two, as evinced by the decrease of significance of Experience & Orthopraxis in the adjusted model. Belief is fairly well correlated with both of these factors and the anchor questions are probably sensitive to it because of this correlation. Knowledge, while not a marker of self-assessed religiosity, is largely uncorrelated with the other factors and therefore a meaningful independent predictor of the other two anchor questions, in spite of its modest effect sizes.

We conclude that the four factors of religiosity as measured by the factor scores form reliable measures of religiosity among Muslim schoolchildren with moderate to strong elements of validity. While the evidence from the convergent validity analysis is reasonably compelling, we must also consider the evidence provided for the construct validity of the scales as preliminary, and deriving largely from the work of El-Menouar on an adult population, without reference to applicable developmental theories.

We now turn to the relationship between the newly developed scale and the El-Menouar model. Perforce, a number of our statements in this regard will be speculative, presenting plausible hypotheses that may need to be explored with more rigour using other means.

A first distinction between the scales occurs in the separation of Belief and Devotion as components of two distinct factors in the new scale; in El-Menouar's model belief, devotion and confirming religious experience consisted of a single factor, called basic religiosity.

The consolidation of Belief into a single factor for pre-adolescents can possibly be explained in terms of levels of maturity in child development. For example, it has been claimed that factors of religiosity are dependent on parental levels of influence (Maliepaard & Lubbers, 2013; Petts, 2011). However, as adolescents mature and develop the cognitive skills to apply their beliefs, reality prevails and beliefs become more authentic and representative of the meaning they attach to them (Pearce & Denton, 2011). Belief tenets form an integral part of religious education and instruction during this foundational stage of a child's education. Belief can be thought of as a cognitive factor where the adolescent processes issues (including through teaching), whereas devotion could be based on imitating behaviour, such that

commitment would result from enthusiasm derived from participating in an activity. We note that Glock's model also involves a standalone Belief dimension.

A second distinction is the absence of a central religious duties dimension in the new scale. We note that ritual and devotion were separate in El-Menouar's model. In adapting her model initially, we added four items to the original two items we retained under basic religiosity, and one item to the original two items (Frequency of ritual prayer and Fasting during Ramadan) we retained under central religious duties. Within the new model, ritual prayer (practice) & devotion are combined as the single factor of Devotion & Practice, reflecting that ritual & devotion are not viewed separately by children. We can postulate that this conflation of devotion, as expressed through voluntary activities, and practice, consisting of compulsory activities under Islam, occurs because both are transmitted by the same means, including parental instruction, Islamic lessons, mosques and Qur'an memorisation centres. At these ages children may practice religion according to parental or other instruction proceeding from an authority figure. A possible corollary is that this factor of religiosity may not be purely reflective of the child's own religious commitments. However, with maturity, attending religious meetings is more about reflection on the part of the individual. We postulate that in Muslim children of this age, the Devotion & Practice factor mirrors Glock's ritualistic dimension.

Thirdly, the Experience & Orthopraxis factor combines the original subdimensions of both confirming and responsive religious experience, as well as orthopraxis. In El-Menouar's model, experience was separated across two factors, after analysis, in consideration of whether it is confirming religious experience (captured under basic religiosity) or responsive religious experience (captured under its own factor, experience). Once again, the combination of both types of experiences under a single

factor is consistent with Glock's dimension of experience. The components of orthopraxis in the new model admittedly differ from E-Menouar's in an effort to make them appropriate for Muslim children. The seven new items thus introduced combine with religious experience in a single factor, in a manner distinct from El-Menouar's model. We can speculate that religious experience drives orthopraxis in children because an objective of the religious education at this stage is to encourage the application of correct religious conduct (Marsden, 2005). Religious education may play a lesser role in an adult's life because it is less likely to be an on-going process. Furthermore, the child may not be as exposed as adults to external factors that would adversely affect their application of correct religious conduct.

Finally, in regard to the Knowledge factor, El-Menouar used 3 self-assessed items, while the newly developed tool retains 7 objectively assessed items, considered relevant to children by the experts consulted in this study and appearing in the school curriculum. The retained items were preferred to El-Menouar's as children of this stage are exposed to religious education through schooling, Islamic centres and educational instructions more than adults. Otherwise, the Knowledge factor is similar to both Glock's and El-Menouar's Knowledge dimension.

The factors selected are consistent with two views of Muslim children's religiosity. The first is a representation of their religiosity as a process of socialisation. Religiosity is passed on from parents and religious institutions as agents of socialisation (Tudge & Rogoff, 1999). Religious influence from parents to children is strong (Hayes & Pittelkow, 1993; Myers, 1996; Ruiter & Van Tubergen, 2009; Wilson & Sandomirsky, 1991) and adolescents appear to influence one another's behaviour (Brechtwald & Prinstein, 2011; De Hoon & Van Tubergen, 2014). In the Devotion & Practice factor, some of the activities measured are undertaken in groups, in which the adolescents

have the opportunity to influence one another in their devotional life (attendance at Quran memorisation centres, attendance at religious lessons in the schools, and practicing prayer).

The factors selected also reflect children's religiosity from a developmental psychology perspective and recognise the cognitive development of children. At age 9 -10, children are at a stage of concrete mental operations, meaning that they cannot yet reason in abstract ways but can reason with the aid of pictures or words (e.g., in recitation lessons about the Qur'an) (Grave & Blissett, 2004; Kane, 1979). Children of 12 are considered to be beginning to reason abstractly about such concepts as belief (Carroll & Steward, 1984). Their religiosity will be reflected in questions they ask about religion. In turn this can be measured by the proxy of how often they attend memorisation centres and religious lessons. They are also just starting to reason independently, but their thinking is still hampered by unrealistic life goals (Carroll & Steward, 1984). In terms of implications, religiosity can be used at this stage as an anchor to guide behaviour.

Three achievements of the research reported in this chapter are (1) the development of the religiosity measurement tool for Muslim children, which was calibrated using 2015 data and validated on 2016 data; (2) while many religiosity measurement tools limit themselves to a single score, we avoided such a unidimensional approach that hinders the ability to detect any dependence or independence relationships between dimensions; and (3) we use a measure where a tool is developed for a specific population and a specific religion. One limitation is particularly relevant to the proposed religiosity measurement instrument. This study was conducted in one governorate in Jordan among Muslim youth and consequently generalisability to other

populations (other governorate in Jordan or other Muslim countries) remains to be demonstrated.

Further research is intended as a follow up longitudinal study to assess conclusively the similarities and distinguishing features of the religiosity scale as compared to the instruments developed by Glock (1962) and even that of El-Menouar (2014).

Chapter 5 : Results of the initial survey of the Irbid school-based smoking study

5.1 Introduction

This chapter examines the results of the 2015 baseline data collection from a survey which was conducted among Muslim school children enrolled in the 5th or 6th grade, within the Irbid Governorate in the north of Jordan, in 2015. The focus of this chapter is the association between religiosity and prevalence of smoking cigarettes and WP among Muslim youth. This is the first study to examine these associations using a modified multidimensional religiosity scale for Muslim school children in Islamic societies. The development of the modified religiosity scale is reported in the previous chapter. The scale is based on the dimensions that were created by Glock (1962) and adapted by El-Menouar (2014) for adult Muslims, and further adapted in this research in order to be appropriate for Muslim children.

5.2 Methods

The statistical analyses were comprised of two main tasks: descriptive analysis and inferential analysis using mixed logistic regression stratified by school. All analyses were restricted to baseline participants (N=926). For the descriptive analysis data were summarised as numbers of participants and percentages. Some of the questions with more than two possible response categories were presented in their original categories for the descriptive analysis, but were collapsed into two or three categories for the logistic analyses due to small numbers in some categories. The variables which were thus re-categorised are presented in Appendix L.

Mixed logistic regression for joint, or simple logistic regression, modelling of the indicators of having ever smoked cigarettes and having ever smoked the WP. The two forms of tobacco use were separately modelled in this chapter. Results of the logistic regressions will be presented with odds ratio (OR) point estimates and 95% confidence intervals (CI); p-values of ≤ 0.05 were considered statistically significant. The primary aim of the logistic regression analyses was to measure the association between religiosity and each mode of tobacco use, adjusting for known or presumed confounding factors arrayed in thematically homogeneous domains.

Literature on model building states that the selection of predictor variables in a regression model has an important influence on the outcome variable (Thayer, 2002, April 1-5). Furthermore, a good model should fit the data adequately; should not be too complex; and should serve as an accurate predictor for new observations. Such a process of selecting a subset of variables from a large number of variables is called model building. A purposeful stepwise selection procedure (Bursac et al., 2008) was used to build the multivariable model.

The first step of the model building was to produce the simple logistic regression for each of the variables of interest with the outcome measures of cigarette and WP tobacco use. The variables of interest were organised into domains of interest (i.e., socioeconomic demographics, family attitudes to tobacco use, family and peer tobacco use, and religiosity). Variables within each domain was considered for inclusion in the Multiple variable logistic regression model based on pre-specified criterion of $p < 0.2$ for the simple associations. Initially, for each domain multiple variable models were developed using stepwise selection processes to identify the best subset of variables associated with the outcome variables. The resultant variables of interest from the non-religiosity domain results were then brought together and also underwent stepwise

selection processes to identify the best subset of non-religiosity variables. Lastly, the religiosity domain scores were added to this subset, and subjected to stepwise selection, in order to produce the final multiple variable logistic regression model. All these statistical analyses were performed using SAS version 9.4 (copyright 2002-2012).

5.3 Results

Students were recruited from five schools in the Irbid Governorate in the north of Jordan in 2015. Details of this recruitment are presented Chapter 3. Out of the 1,080 students recruited in the five schools, 929 (86%) students provided both parental consent and student assents. Of all the students who had given assent to participate in the study, three reported being non-Muslim and were excluded from the analysis.

5.3.1 Descriptive analysis

5.3.1.1 Demographic characteristics

Table 18 presents the demographic characteristics of the 926 participants. The majority of participants were Jordanians (90%) and 54% were male. In the education-related variables, 76% were from public schools and 24% from private schools. The distribution between the two surveyed grades was almost even, with 49% (n=456) in 5th grade and 51% (n=470) in 6th grade. Most of students (95%) lived with both parents (father and mother) while the remaining 5% lived with solo parents or other forms of living arrangements. The majority of students (70%) aged 11 years or older. Total daily pocket money varied, with 42% of students having less than half a dinar (NZ\$1) and 58% more than half a dinar. With regard to the parents, 58% of children had fathers who had at most a high school qualification, with the rest (42%) having at least a tertiary diploma or university degree. This was similar for mothers, with 58% having a at most a high school qualification and the rest (42%) having at least a tertiary diploma or university degree.

Table 18. Sociodemographic characteristics at baseline (N=926)

Variable	Level	N	%*
Sex	Males	504	54%
	Females	422	46%
Grade	5th	456	49%
	6th	470	51%
School	Public/Male	259	28%
	Public/Female	204	22%
	Public-Female/Mixed	145	16%
	Public/Male	96	10%
	Private/Mixed	222	24%
Nationality	Jordanian	831	90%
	Non-Jordanian	94	10%
	Not reported	1	---
Live with	My Father and my Mother	877	95%
	My Mother only	40	4%
	My Father only	7	1%
	Other	2	---
Age in 2015	Nine years and less	23	2%
	Ten years	247	27%
	Eleven years	412	44%
	Twelve years	194	21%
	Thirteen years and more	50	5%
Daily pocket money (JOD)**	less than quarter of dinar	84	9%
	Quarter dinar to less than half of dinar	305	33%
	Half dinar to less than 75 piasters	389	42%
	75piasters to less than one dinar	82	9%
	One dinar and more	61	7%
	Not reported	5	---
Father's education	High school or less	532	58%
	Diploma	118	13%
	Bachelor	229	25%
	Graduate (Master or PhD)	41	4%
	Not reported	6	---
Mother's education	High school or less	531	58%
	Diploma	132	14%
	Bachelor	212	23%
	Graduate (Master or PhD)	48	5%
	Not reported	3	---
Total†		926	100%

Notes. *As a result of rounding, some percentages may not add up to 100%.

**1 JOD= NZ \$2.

†3 non-Muslim students were excluded.

5.3.1.2 Wealth index

Characteristics of the household possessions that comprise the Jordanian wealth index variables are shown in Table 19. The respective percentages reported by the sample were: 70% laptops, 88% flat TV, 70% dining room table, 64% internet at home, 92% cell phone and 70% microwave. It was identified that 66% lived in houses owned by their parents, and 7% had maids at home. Of the 8 household items surveyed, 32.3% participant households had 4 household items or fewer while the other 67% had 5 of the items or more.

Table 19. Household possessions characteristics at baseline (N=926)

Wealth index variable	Level	N	%*
Laptop	No	273	30%
	Yes	652	70%
	Not reported	1	---
Flat TV	No	111	12%
	Yes	814	88%
	Not reported	1	---
Dining room table	No	279	30%
	Yes	645	70%
	Not reported	2	---
Internet at home	No	336	36%
	Yes	587	64%
	Not reported	3	---
Cell phone	No	70	8%
	Yes	854	92%
	Not reported	2	---
Microwave	No	274	30%
	Yes	650	70%
	Not reported	2	---
A maid	No	860	93%
	Yes	63	7%
	Not reported	3	---
House rented	No	607	66%
	Yes	318	34%
	Not reported	1	---
Number of items	0	3	0.3%
	1	10	1%
	2	46	5%
	3	100	11%
	4	142	15%
	5	231	25%
	6	294	32%
	7	77	8%
	8	16	2%
	Not reported	7	---
Total		926	100%

Notes. *As a result of rounding, some percentages may not add up to 100%.

5.3.1.3 Ever smoked tobacco (cigarettes and WP) by sex

Of the 926 students enrolled at baseline, 15% had tried cigarette smoking and 36% had tried WP smoking. Examining these rates by sex, females had lower rates for both cigarettes (4% vs 11% for males) and WP (15% vs 21% for males), however the female's rates were much lower than males for cigarettes compared to WP. Table 20 summarises these statistics.

Table 20. *Students who had ever smoked tobacco by modality and sex at baseline (N=926)*

Ever smoker	Level	Male		Female		Total	
		N	%	N	%	N	%
Ever smoked cigarettes	No	405	44%	379	41%	784	85%
	Yes	98	11%	43	4%	141	15%
	Not reported	1	---	0	---	1	---
Ever smoked WP	No	309	33%	284	31%	593	64%
	Yes	193	21%	138	15%	331	36%
	Not reported	2	---	0	---	2	---
Total		504	54%	422	46%	926	100%

5.3.1.4 Cigarette and WP smoking characteristics

Students who had ever smoked cigarettes or WP were also surveyed for smoking characteristics that included the number of days of smoking in the last month, who they smoked with within the last month and who they usually smoke with (see Table 21). Of the 141 ever cigarette smokers, 50% of the students smoked cigarettes 1–2 days per month while 15% smoked 3–30 days and 36% did not smoke at all. Among the 331 ever WP smokers, 54% smoked 1–2 days while 22% smoked 3–30 days and 24% did not smoke at all.

In terms of whom they first smoked with, of the 141 ever cigarette smokers, 34% had first smoked alone, 17% with parents, 21% with other family members and 28% with friends or others. Of the 331 ever WP smokers, 12% had first smoked alone while 21% with parents, 47% with other family members and 20% with friends or others.

Furthermore, as shown in Table 21, students were surveyed about whom they were with when they usually smoked. Of the 141 ever cigarette smokers, 36% usually smoked alone; 13% smoked with parents; 19% with other family members and 31% with friends or others. Of the 331 ever WP smokers, 14% usually smoked alone; 17% with parents, 45% with other family members and the rest usually smoked with friends or others (24%).

Table 21. *Cigarette and WP smoking characteristics at baseline*

Smoking variables	Level	Cigarette smoking		WP smoking	
		N	%*	N	%
Days smoking in last month	0 days	49	36%	79	24%
	1 - 2 days	69	50%	178	54%
	3 - 5 days	7	5%	48	15%
	6 - 9 days	9	7%	9	3%
	10 - 30 days	4	3%	14	4%
	Not reported	3	---	3	---
With whom did you first smoke?	Alone	46	34%	40	12%
	With parents	23	17%	68	21%
	With other family members	29	21%	156	47%
	With friends	28	20%	51	16%
	Other	11	8%	14	4%
	Not reported	4	---	2	---
With whom do you usually smoke?	Alone	50	36%	45	14%
	With parents	18	13%	57	17%
	With other family members	26	19%	147	45%
	With friends	32	23%	59	18%
	Other	11	8%	19	6%
	Not reported	4	---	4	---
Total		141	100%	331	100%

Notes. *As a result of rounding, some percentages may not add up to 100%.

5.3.1.5 Cigarette smoking characteristics

Cigarette smoking characteristics among who had ever smoked cigarettes (n=141) were surveyed (see Table 22). These relate to the number of cigarettes smoked per day in the last month and how the students obtained the cigarettes. Most students who had ever smoked cigarettes smoked less than one cigarette per day (47%), while 18% smoked one cigarette per day or more and 34% had not smoked cigarettes during the

past 30 days. In terms of how the students obtained the cigarettes in the last month, 25% of students who smoked cigarettes in the last month bought them with their own money or provide money for others to buy them while 75% got them from other people, or by other means such as stealing.

There was a slight disagreement between the responses to the two questions in Table 22. It was found that 47 students responded that they had not smoked in last month when asked about the number of cigarettes smoked per day, while 35 students responded they had not smoked in last month when they asked about how they obtained cigarettes in last month. That is likely to have occurred because the student did not obtain cigarettes in the last month but did smoke them.

Table 22. *Cigarette smoking characteristics at baseline*

Cigarettes variables	Level	Ever cigarette smoker	
		N	%*
No of cigarettes smoked/day in last month	I did not smoke in last month	47	34%
	Less than 1 cigarette per day	65	47%
	1 cigarette	13	9%
	2 - 5 cigarettes	8	6%
	6 -10 cigarettes	2	1%
	11 to more than 20 cigarettes/day	3	2%
	Not reported	3	---
How did you get cigarettes in last month	I did not smoke in last month	35	25%
	I bought them in a store	18	13%
	I gave someone else money to buy them for me	8	6%
	I borrowed them	25	18%
	I stole them	11	8%
	An older person gave them to me	19	14%
	I got them some other way	22	16%
	Not reported	3	---
Total		141	100%

Notes. *As a result of rounding, some percentages may not add up to 100%.

5.3.1.6 WP smoking characteristics

Of the 926 students, 331 had ever smoked WP, and 250 reported smoking WP in the last month. Among those, 75% smoked less than one rock (see 2.2.1), while 19% students smoked 1 rock, 6% students smoked 2 rocks or. In terms of usual places of WP smoking, 63% smoked at home, and the remainder smoked in other places, including coffee shops, restaurants, friends' houses or other. The five students that responded to usual place of smoking WP with never smoked WP, may have confused time frames as previous question was in the last month. Table 23 summarises the results.

Table 23. *WP smoking characteristics at baseline (N=926)*

WP variables	Level	Ever WP smoker	
		N	%
No. of WP rocks smoked/day in last month	I did not smoke WP in the last month	78	24%
	Less than 1 rock	188	57%
	1 rock	47	14%
	2 - 5 rock	13	4%
	More than the above	2	1%
	Not reported	3	---
Usual place of WP smoking	I have never smoked WP	5	2%
	At home	204	62%
	At coffee shop	25	8%
	At a restaurant	11	3%
	At a friend's house	47	14%
	Other	35	11%
	Not reported	4	---
Total		331	100%

5.3.1.7 Smoking initiation by age

Students that had ever smoked were surveyed their age of first initiation of tobacco smoking. Of the 141 who had ever smoked cigarettes, 136 answered the question about the age they started smoking cigarettes.

Table 24 shows that 55% students who had ever smoked cigarettes began smoking cigarettes at 9 years or younger. Table 24 also shows the age of first initiation for WP. Of the 331 who had ever smoked WP, 329 students answered question about the age they started smoking. It was found that 49% of the ever WP smokers began smoking WP at 9 years or younger.

Table 24. Age of tobacco smoking initiation at baseline

Tobacco smoking	Student current age	Age of first tried cigarette/WP smoking											
		≤ 7 years		8–9 years		10–11 years		12 years		>12 years		Total	
		N	%	N	%	N	%	N	%	N	%	N	%*
Cigarettes smoking	9 years and less	---	---	6	100%	---	---	---	---	---	---	6	4%
	10 years	4	16%	12	48%	9	36%	---	---	---	---	25	18%
	11 years	14	23%	23	37%	25	40%	---	---	---	---	62	46%
	12 years	5	14%	9	26%	13	36%	8	22%	---	---	35	26%
	13 years or more	---	---	1	13%	1	13%	3	38%	3	38%	8	6%
	Total	23	17%	51	38%	48	35%	11	8%	3	2%	136	100%
WP smoking	9 years and less	1	11%	8	89%	---	---	---	---	---	---	9	3%
	10 years	14	18%	36	46%	29	37%	---	---	---	---	79	24%
	11 years	20	14%	54	38%	67	48%	---	---	---	---	141	43%
	12 years	9	12%	15	31%	25	32%	29	---	---	---	78	24%
	13 years or more	---	---	5	23%	8	36%	6	27%	3	14%	22	7%
	Total	44	13%	118	36%	129	39%	35	11%	3	1%	329	100%

Notes. *As a result of rounding, some percentages may not add up to 100%.

5.3.1.8 Family and peer smoking

Table 25 presents the characteristics of students' family and peer smokers. It was found that 54% of students had at least one of their parents who smoked cigarettes and 35% had at least one parent who smoked WP. Table 25 also shows that students were surveyed about whether there is anyone who smokes at home. It was identified that 24% of student's households had cigarette smoking while 28% had WP smoking. Table 25 also shows the results of when students were surveyed about whether they have a close friend who smokes cigarettes. The responses show that 71% of students had no close friend who smoked cigarettes, while 19% had some friends who smoked cigarettes, and 10% had most or all friends who smoked cigarettes. Similarly, the responses showed that 68% had no close friends who smoked WP, while 21% had some friends who smoked WP, and 11% had most or all friends who smoked WP.

Table 25. Family and peer smoking at baseline (N=926)

Family and peer smoking	Level	Cigarettes		WP	
		N	%	N	%
Parents smoke	None	410	45%	576	63%
	Father only	429	47%	213	23%
	Mother only	18	2%	29	3%
	Both	50	5%	82	9%
	I don't know	12	1%	18	2%
	Not reported	7	---	8	---
Anyone in house smoke	No	700	76%	661	72%
	Yes	218	24%	259	28%
	Not reported	8	---	6	---
Close friend smoke	None of them	647	71%	621	68%
	Some of them	174	19%	189	21%
	Most of them	65	7%	66	7%
	All of them	27	3%	37	4%
	Not reported	13	---	13	---

5.3.1.9 Family attitudes

Students' family attitudes towards cigarette and WP smoking are presented in Table 26. It was found that the majority of students (74%) agreed that their parents would be upset if they found them smoking cigarettes. The remaining students felt that their

parents would not be upset if they found out they were smoking (11%) or did not know how their parents would react (15%). Similar trends for WP smoking were observed, where 69% agreed that parents would be upset if they found them smoking WP, with the remaining students feeling that their parents would not be upset (16%) or did not know how their parents would feel (15%). Just over half of the students surveyed said their parents had rules about not smoking (55% for cigarette smoking and 52% for WP smoking). The remaining students said their parents did not have rules about not smoking (24% for cigarette smoking and 26% for WP smoking) or did not know if their parents had such rules (21% for cigarette smoking and 22% for WP smoking).

The majority of students had parents who did not allow youth under the age of 16 to smoke (74% for cigarettes and 69% for WP). A small percentage of parents allowed under age 16 to smoke: 10% for cigarette smoking and 12% for WP smoking. The percentage of students who did not know if their parent allowed the smoking of cigarettes under the age of 16 was 16% and 19% for WP.

Table 26. *Family attitudes towards smoking at baseline (N=926)*

Family attitudes	Level	Cigarette smoking		WP smoking	
		N	%	N	%
Parents upset	Agree	688	74%	639	69%
	Don't know	138	15%	139	15%
	Disagree	98	11%	146	16%
	Not reported	2	---	2	---
Parents have rules about not smoking	Agree	512	55%	480	52%
	Don't know	193	21%	201	22%
	Disagree	218	24%	242	26%
	Not reported	3	---	3	---
Parents allow those under age 16 to smoke	Agree	95	10%	113	12%
	Don't know	145	16%	171	19%
	Disagree	684	74%	640	69%
	Not reported	2	---	2	---

5.3.1.10 Susceptibility to smoking

Susceptibility to smoking was also measured (see Table 27). Of the 926 students, 784 had never smoked cigarettes and 590 had never smoked WP. Students were asked how they would respond when offered to smoke by best friend and their smoking intentions in the next 12 months. The majority of students were reported not being susceptible to cigarette and WP smoking, indicating that they would not accept cigarettes or WP when offered by choosing the answer “Definitely not”. In terms of the next 12 months, there were similar trends, with the majority of students indicating that they would not smoke cigarettes or WP.

Table 27. *Susceptibility to smoking at baseline (N=784 for cigarettes and 590 for WP)*

Susceptibility	Level	Cigarette smoking		WP smoking	
		N	%	N	%
If your best friend offered you	Definitely not	783	100%	589	100%
	Probably not	1	0%	1	0%
	Probably yes	---	---	---	---
	Definitely yes	---	---	---	---
	Not reported	---	---	3	---
In 12 months do you think you will be smoking?	Definitely not	778	99%	590	100%
	Probably not	5	1%	---	---
	Probably yes	1	0%	---	---
	Definitely yes	---	---	---	---
	Not reported	---	---	3	---

5.3.1.11 Ruling on smoking in Islam

In terms of their understanding of the Islamic ruling on smoking, 46% of students thought that smoking was forbidden while 34% thought it was discouraged and only 1% thought that it was desirable; 19% of students indicated that they did not know about the Islamic ruling (see Table 28). The results show that the majority were aware that smoking is at least discouraged in Islam.

Table 28. *Understanding of ruling on smoking in Islam at baseline (N=926)*

	Level	N	%
Understanding of ruling of smoking in Islam	Forbidden (<i>haram</i>)	421	46%
	Discouraged (<i>makruh</i>)	315	34%
	Desirable	13	1%
	Don't know	172	19%
	Not reported	5	---

5.3.2 Simple logistic regression analyses

5.3.2.1 Demographics

Table 29 examines the associations between having ever smoked a cigarette or WP with sociodemographic characteristics. Sociodemographic variables such as sex, grade, nationality, living status, age, amount of daily pocket money and parental education level were considered as covariates in these logistic regression analyses. Males were more likely to smoke cigarettes as females (OR= 2.26; 95% CI, 1.02, 4.98; $p=0.04$). Similarly, males were more likely to smoke WP as females (OR=2.12; 95% CI 1.18, 3.80; $p=0.01$).

Furthermore, age of students was associated with both cigarette smoking and WP smoking ($p=0.05$). Students aged 11 years old were more likely to smoke cigarettes compared to those aged 10 (OR=1.72; 95% CI 1.05, 2.82). Students aged 12 years old were more likely to smoke cigarettes than those aged 10 years old (OR=2.10; 95% CI 1.20, 3.68). For WP smoking, students aged 12 years old were more likely to smoke WP than those aged 10 years (OR=1.63; 95% CI 1.08, 2.45), and students aged 13 years or older were more likely to smoke WP than those aged 10 years (OR=2.31; 95% CI 1.22, 4.39).

Children who received daily pocket money of less than 0.50 JOD were significantly associated with being less likely to smoke WP (OR=0.72; 95% CI 0.54, 0.96; $p=0.02$). No association between daily pocket money and cigarette smoking was observed.

Table 29. Simple logistic regression analyses of association between student smoking and sociodemographic characteristics at baseline (N=926)

Demographics	Level	Ever smoked cigarettes					Ever smoked WP				
		N	%	OR	95% CI	p-value*	N	%	OR	95% CI	p-value*
Sex	Male	503	19%	2.26	(1.02,4.98)	0.04	502	38%	2.12	(1.18,3.80)	0.01
	Female	422	10%	1.00	---		422	33%	1.00	---	
Grade	5th	455	15%	1.00	---	0.50	454	34%	1.00	---	0.15
	6th	470	16%	1.13	(0.79,1.63)		470	38%	1.22	(0.93,1.61)	
Nationality	Jordanian	831	16%	1.00	---	0.46	830	36%	1.00	---	0.42
	Non-Jordanian	93	13%	0.79	(0.41,1.49)		93	31%	0.83	(0.52,1.32)	
Live with both parents	No	49	18%	1.25	(0.59,2.64)	0.57	49	29%	0.68	(0.36,1.29)	0.23
	Yes	876	15%	1.00	---		875	36%	1.00	---	
Age	9 years and less	23	26%	3.47	(1.24,9.75)	0.05	23	39%	1.33	(0.54,3.24)	0.05
	10 years	246	10%	1.00	---		246	33%	1.00	---	
	11 years	412	16%	1.72	(1.05,2.82)		411	35%	1.20	(0.85,1.69)	
	12 years	194	19%	2.10	(1.20,3.68)		194	40%	1.63	(1.08,2.45)	
	13 years and more	50	16%	1.82	(0.75,4.40)		50	44%	2.31	(1.22,4.39)	
Daily pocket money**	<0.50 JOD	388	15%	1.01	(0.69,1.48)	0.95	388	30%	0.72	(0.54,0.96)	0.02
	≥0.50 JOD	532	15%	1.00	---		531	40%	1.00	---	
Father's education	≤ High school	531	15%	1.00	---	0.98	530	37%	1.00	---	0.69
	> High school	388	15%	1.00	(0.69,1.45)		388	35%	0.95	(0.71,1.25)	
Mother's education	≤ High school	530	16%	1.00	---	0.53	529	35%	1.00	---	0.75
	>High school	392	15%	0.89	(0.61,1.29)		392	37%	1.05	(0.79,1.38)	

Notes. *Significant difference at $p \leq 0.05$ are denoted in bold font; non-significant difference at $p > 0.05$; results stratified for school cluster effect.

**1JOD=NZ\$2.

5.3.2.2 Wealth index variables

Table 30 shows the association between owning items among the wealth index variables (owning a laptop, flat screen TV, dining room table, cell phone, microwave, having internet at home, having a maid and owning a house) and smoking (defined as ever smoked a cigarette or WP).

Children from families who did not own a laptop (OR=0.66; 95% CI 0.49, 0.91; $p<0.001$); flat screen TV (OR=0.56; 95% CI 0.35, 0.90; $p<0.02$); had no internet at home (OR=0.61; 95% CI 0.45, 0.81; $p<0.001$) and no cell phone (OR=0.52; 95% CI 0.29, 0.94; $p<0.03$) were less likely to smoke WP than those who answered “Yes” to these items in the wealth index variables. The results were statistically significant in all instances. The sum of all wealth indices showed a very strong inverse association with WP smoking (OR=1.27; 95% CI, 1.14, 1.41; $p<0.0001$).

Table 30. Simple logistic regression analyses of association of between student smoking and wealth index at baseline (N=926)

Wealth index variables	Level	Ever smoked cigarettes					Ever smoked WP				
		N	%	OR	95% CI	p-value*	N	%	OR	95% CI	p-value*
Laptop	No	272	14%	0.90	(0.60,1.35)	0.61	272	29%	0.66	(0.49,0.91)	0.001
	Yes	652	16%	1.00	---		651	39%	1.00	---	
Flat TV	No	111	14%	0.86	(0.48,1.54)	0.60	111	23%	0.56	(0.35,0.90)	0.02
	Yes	813	15%	1.00	---		812	37%	1.00	---	
Dining room table	No	279	12%	0.65	(0.43,1.00)	0.05	279	29%	0.69	(0.51,0.95)	0.02
	Yes	644	17%	1.00	---		643	39%	1.00	---	
Internet at home	No	335	16%	1.03	(0.71,1.50)	0.87	334	29%	0.61	(0.45,0.81)	0.001
	Yes	587	15%	1.00	---		587	40%	1.00	---	
Cell phone	No	70	13%	0.78	(0.37,1.61)	0.50	70	23%	0.52	(0.29,0.94)	0.03
	Yes	853	15%	1.00	---		852	37%	1.00	---	
Microwave	No	273	12%	0.66	(0.43,1.01)	0.06	272	31%	0.76	(0.56,1.04)	0.08
	Yes	650	17%	1.00	---		650	38%	1.00	---	
A maid	No	859	15%	1.16	(0.55,2.43)	0.69	858	35%	0.67	(0.39,1.15)	0.14
	Yes	63	14%	1.00	---		63	41%	1.00	---	
House rented	No	606	15%	0.78	(0.53,1.14)	0.20	605	36%	0.92	(0.69,1.24)	0.59
	Yes	318	17%	1.00	---		318	36%	1.00	---	
Total number of items	---	---	---	1.13	(0.99,1.29)	0.07	---	---	1.27	(1.14,1.41)	<.0001

Notes. *Significant difference at $p \leq 0.05$ are denoted in bold font; non-significant difference at $p > 0.05$; results stratified for school cluster effect.

5.3.2.3 Family and peer smoking

Table 31 describes the relationship between family and peer smoking factors with smoking (defined as having ever smoked a cigarette or WP).

5.3.2.3.1 Results for ever smoked cigarettes

It was identified that there was a statistically significant relationship between increased likelihood of smoking cigarettes for children who had parents, friends or members of their household who smoked either cigarettes or WP. Children who had a parent who smoked cigarettes were more likely to smoke cigarettes than students of parents who did not smoke cigarettes (OR=1.52; 95% CI 1.04, 2.22; $p<0.03$). Similarly, children having a parent who smoked WP were more likely to smoke cigarettes than students of parents who did not smoke WP (OR=1.96; 95% CI 1.35, 2.83; $p<0.0004$). With regard to the other family smoking and peer characteristics, students who had anyone in the house who smoked cigarettes or WP were more likely to smoke cigarettes or WP than students with no one in the house who smoked cigarettes or WP (cigarette OR=2.31; 95% CI 1.57, 3.39; $p<0.0001$; and WP OR=2.12; 95% CI 1.46, 3.08; $p<0.0001$). Moreover, students who had friends who smoked cigarettes were more likely to smoke cigarettes than students with non-smoking friends ($p<0.0001$) (some friends who smoked cigarettes OR=4.63; 95% CI 3.01, 7.14; most/all friends smoked cigarettes OR=5.05; 95% CI 3.01, 8.48). Similarly, students with friends who smoked WP were more likely to smoke cigarette than students with non-smoking friends ($p<0.0001$) (some friends who smoked cigarettes OR=2.54; 95% CI 1.65, 3.91; most/all friends smoked cigarettes OR=4.49; 95% CI 2.76, 7.30).

5.3.2.3.2 Results for ever smoked WP

As identified above, there was a statistically significant relationship between increased likelihood of smoking WP for students who had parents, friends or members of their household smoking either cigarettes or WP. Children having a parent smoke cigarettes were more likely to smoke WP than students of parents who did not smoke cigarettes (OR=1.51; 95% CI 1.14, 2.01; $p<0.004$). However, having a parent who smoked WP meant that children were more likely to smoke WP than students with parents who did not smoke WP (OR=4.17; 95% CI 3.10, 5.60; $p<0.0001$). Students who had anyone in the house smoking cigarettes were more likely to smoke WP than students without a cigarette-smoking household member (OR=2.21; 95% CI 1.61, 3.04; $p<0.0001$). This effect was greater among students who had a household member smoking WP – making these students considerably more likely to smoke WP than were students with no one smoking WP in house (OR=6.67; 95% CI 4.81, 9.26; $p<0.0001$). Moreover, students who have some of their friends or most/all of their friends' smoking cigarettes were more likely to smoke WP than were students of non-smoking friends ($p<0.0001$) (some friends who smoked cigarettes OR=2.99; 95% CI 2.09, 4.27; all/most friends smoking cigarettes OR=5.23; 95% CI 3.25, 8.41). In addition, students with friends who smoked WP were more likely to smoke WP than were students with non-smoking friends ($p<0.0001$) (some friends who smoked WP OR=3.67; 95% CI 2.60, 5.18; most/all friends smoking WP OR=6.90; 95% CI 4.32, 11.0).

Table 31. Simple logistic regression analyses of association between student smoking and family and peer smoking at baseline (N=926)

Family and peer smoking	Level	Ever cigarette smoker					Ever WP smoker				
		N	%	OR	95% CI	p-value*	N	%	OR	95% CI	p-value*
Parents smoke cigarettes	No	410	13%	1.00	---	0.03	410	30%	1.00	---	0.004
	Yes	497	18%	1.52	(1.04,2.22)		496	42%	1.51	(1.14,2.01)	
Parents smoke WP	No	576	13%	1.00	---	0.0004	575	24%	1.00	---	<.0001
	Yes	324	21%	1.96	(1.35,2.83)		324	57%	4.17	(3.10,5.60)	
Anyone in house smokes cigs	No	686	13%	1.00	---	<.0001	686	31%	1.00	---	<.0001
	Yes	214	25%	2.31	(1.57,3.39)		214	50%	2.21	(1.61,3.04)	
Anyone in house smokes WP	No	649	12%	1.00	---	<.0001	648	25%	1.00	---	<.0001
	Yes	253	24%	2.12	(1.46,3.08)		253	66%	6.67	(4.81,9.26)	
Friends smoke cigarettes	None of them	647	8%	1.00	---	<.0001	646	27%	1.00	---	<.0001
	Some of them	174	31%	4.63	(3.01,7.14)		174	52%	2.99	(2.09,4.27)	
	Most /All of them	92	34%	5.05	(3.01,8.48)		92	66%	5.23	(3.25,8.41)	
Friends smoke WP	None of them	621	10%	1.00	---	<.0001	620	25%	1.00	---	<.0001
	Some of them	189	23%	2.54	(1.65,3.91)		189	55%	3.67	(2.60,5.18)	
	Most/All of them	103	35%	4.49	(2.76,7.30)		103	70%	6.90	(4.32,11.0)	

*Notes.**Significant difference at $p \leq 0.05$ are denoted in bold font; non-significant difference at $p > 0.05$; results stratified for school cluster effect.

5.3.2.4 Family attitude variables

5.3.2.4.1 Results for ever smoked cigarettes

Table 32 shows that ever smoking cigarettes was associated with parental attitude to cigarettes smoking ($p=0.04$). There were no significant difference between agree and disagree. However, agree compared to don't know was significant (OR=0.60; 95% CI 0.37, 0.97). Ever smoking cigarettes was associated with parental attitude to WP smoking ($p=0.001$). Students who agreed that their parents get upset if they smoked WP were significantly less likely to smoke cigarettes (OR=0.44; 95% CI 0.28, 0.69).

Students were asked if their parents had rules about not smoking cigarettes compared to students who had parents who did not have any rules about not smoking cigarettes and it was associated with students who ever smoke cigarettes ($p\leq 0.02$). Students who had parents had rules about not smoking cigarettes were significantly less likely to smoke cigarettes (OR=0.58; 95% CI 0.38, 0.90). Also, Students were asked if their parents had rules about not smoking WP and it was associated with students who ever smoke cigarettes ($p\leq 0.02$). Students who had parents had rules about not smoking cigarettes were significantly less likely to smoke cigarettes (OR=0.58; 95% CI 0.38, 0.89).

Moreover, students also asked if their parents thought it was acceptable if children under the age of 16 smoked WP compared to students whose parents who thought it was not were associated with students who ever smoke cigarettes ($p=0.01$). Students of parents who thought it was acceptable if children under the age of 16 smoked WP were more likely to smoke cigarettes than students whose parents who thought it was not OK (OR=2.09; 95% CI 1.27, 3.43).

5.3.2.4.2 Results for ever smoked WP

Table 32 shows that students who said their parents get upset if they smoked cigarettes were associated with students who ever smoke WP ($p < 0.008$). There were no significant difference between agree and disagree. However, agree compared to don't know was significant (OR=0.58; 95% CI 0.40, 0.85).

Students surveyed if their parents had rules about not smoking cigarette compared to students who had parents who did not have any rules about not smoking cigarettes and it was associated with students who ever smoke WP ($p < 0.0001$). Students who said their parents had rules about not smoking cigarette (OR=0.45; 95% CI 0.32, 0.62) and WP (OR=0.38; 95% CI 0.28, 0.53) were less likely to smoke WP than were students who had parents who did not have any rules about not smoking cigarettes and WP. However, those who did not know if their parents have rules about not smoking cigarettes were less likely to smoke WP than were students with parents with no rules about not smoking cigarettes and WP (OR=0.61; 95% CI 0.41, 0.92) and WP (OR=0.57; 95% CI 0.39, 0.84).

It was also observed that students of parents who thought it was acceptable if children under 16 years smoked WP compared to students whose parents who thought it was not acceptable were associated with students who ever smoke WP ($p < 0.0001$). Students of parents who thought it was acceptable if children under 16 years smoked WP were more likely to smoke WP than were students with parents who did not think it was acceptable (OR=2.76; 95% CI 1.82, 4.18). Those who did not know if their parents thought it was OK to smoke WP when under 16 were more likely to smoke WP compared to children of parents who did not think it was acceptable (OR=1.53; 95% CI 1.07, 2.18).

Table 32. Simple logistic regression analyses of association between student smoking and family attitudes at baseline (N=926)

Family attitude variables	Level	Ever smoked cigarettes					Ever smoked WP				
		N	%	OR	95% CI	p-value*	N	%	OR	95% CI	p-value*
Parents upset if child smokes cigarettes	Agree	687	14%	0.62	(0.36,1.06)	0.04	686	33%	0.68	(0.44,1.05)	0.008
	Don't know	138	20%	1.03	(0.54,1.97)		138	46%	1.17	(0.69,1.98)	
	Disagree	98	20%	1.00	---		98	42%	1.00	---	
Parents upset if child smokes WP	Agree	638	13%	0.44	(0.28,0.69)	0.001	637	29%	0.28	(0.19,0.41)	<.0001
	Don't know	139	17%	0.64	(0.36,1.15)		139	45%	0.59	(0.37,0.95)	
	Disagree	146	25%	1.00	---		146	58%	1.00	---	
Parents have rules about not smoking cigarettes	Agree	512	12%	0.58	(0.38,0.90)	0.02	512	30%	0.45	(0.32,0.62)	<.0001
	Don't know	192	19%	0.96	(0.58,1.58)		192	38%	0.61	(0.41,0.92)	
	Disagree	218	19%	1.00	---		217	49%	1.00	---	
Parents have rules about not smoking WP	Agree	480	12%	0.58	(0.38,0.89)	0.02	480	28%	0.38	(0.28,0.53)	<.0001
	Don't know	200	19%	0.97	(0.60,1.57)		200	37%	0.57	(0.39,0.84)	
	Disagree	242	19%	1.00	---		241	51%	1.00	---	
Parents think it is ok if child<16yrs smokes cigarettes	Agree	95	18%	1.38	(0.78,2.44)	0.18	95	42%	1.40	(0.90,2.18)	0.33
	Don't know	144	20%	1.49	(0.93,2.37)		144	36%	1.07	(0.73,1.56)	
	Disagree	684	14%	1.00	---		683	35%	1.00	---	
Parents think it is OK if child<16yrs smokes WP	Agree	113	24%	2.09	(1.27,3.43)	0.01	113	55%	2.76	(1.82,4.18)	<.0001
	Don't know	170	18%	1.45	(0.92,2.29)		170	41%	1.53	(1.07,2.18)	
	Disagree	640	13%	1.00	---		639	31%	1.00	---	

Notes.* Significant difference at $p \leq 0.05$ are denoted in bold font; non-significant difference at $p > 0.05$; results stratified for school cluster effect.

5.3.2.5 Ruling on smoking in Islam

The association between student's ever smoking cigarette or WP and their interpretation of the ruling on smoking in Islam is shown in Table 33. Understanding of the ruling on smoking in Islam were associated with students who ever smoke cigarettes ($p=0.001$). Students who thought smoking was desirable or who did not know the ruling were more likely to smoke cigarettes ("Desirable" OR=6.64; 95% CI 2.10, 21.0; "Do not know" OR=2.11; 95% CI 1.31, 3.41) compared to those who thought it was "Forbidden".

Similarly, understanding of the ruling on smoking in Islam were associated with students who ever smoke WP ($p<0.0001$). Students who chose the "Desirable" option were considerably more likely to smoke WP than were students who chose "Discouraged" or "Don't know" (OR=5.10; 95% CI 1.52, 17.1), whereas those who chose "Discouraged" were more likely to smoke WP (OR=1.40; 95% CI 1.01, 1.92) and those who chose "Do not know" were more likely to smoke WP (OR=2.24; 95% CI 1.54, 3.25) compared to those students who believed the Islam ruling on smoking to be "Forbidden".

Table 33. Simple logistic regression analyses of association between student smoking and their understanding of the ruling on smoking in Islam at baseline (N=926)

	Level	Ever smoked cigarettes					Ever smoked WP				
		N	%	OR	95% CI	p-value*	N	%	OR	95% CI	p-value*
Ruling on smoking in Islam	Forbidden	421	13%	1.00	---	0.001	420	30%	1.00	---	<.0001
	Discouraged	315	15%	1.31	(0.85,2.02)		315	35%	1.40	(1.01,1.92)	
	Desirable	13	46%	6.64	(2.10,21.0)		13	69%	5.10	(1.52,17.1)	
	Don't know	172	21%	2.11	(1.31,3.41)		172	49%	2.24	(1.54,3.25)	

*Notes.** Significant difference at $p \leq 0.05$ are denoted in bold font; non-significant difference at $p > 0.05$; results stratified for school cluster effect.

5.3.2.6 The association of ever cigarette and ever WP smoking with religiosity

The association between the religiosity factors (Chapter 4) – Experience & Orthopraxis; Knowledge, Belief; and Devotion & Practice – and smoking is presented in Table 34. Note that the religiosity factors are continuous measures, therefore the ORs relate to a unit change in religiosity scores. Students who scored higher under the following categories of religiosity were significantly less likely to smoke cigarettes: Experience & Orthopraxis (OR=0.78; 95% CI 0.68, 0.90; $p<0.0007$; Belief (OR=0.81; 95% CI 0.71, 0.94; $p=0.005$; and Devotion & Practice (OR=0.78; 95% CI 0.72, 0.86, $p<0.0001$). Only the association with Knowledge was non-significant (OR=0.98; 95% CI 0.9, 1.06; $p<0.59$). Among the ever WP smokers the religiosity factors Experience & Orthopraxis and Devotion & Practice were significantly associated with being less likely to smoke WP (OR=0.83; 95% CI 0.74, 0.94; $p<0.003$; and OR=0.81; 95% CI 0.75, 0.87; $p<0.0001$, respectively).

Table 34. Simple logistic regression analyses of association of baseline between student smoking and religiosity at baseline (N=926)

Religiosity factors	Ever smoked cigarettes			Ever smoked WP		
	Unadjusted OR			Unadjusted OR		
	OR	95% CI	p-value*	OR	95% CI	p-value*
Experience & Orthopraxis (Factor1)	0.78	(0.68,0.90)	0.0007	0.83	(0.74,0.94)	0.003
Knowledge (Factor2)	0.98	(0.90,1.06)	0.59	0.99	(0.93,1.06)	0.77
Belief (Factor3)	0.81	(0.71,0.94)	0.005	0.96	(0.85,1.10)	0.58
Devotion & Practice (Factor4)	0.78	(0.72,0.86)	<.0001	0.81	(0.75,0.87)	<.0001

Notes. *Significant difference at $p\leq 0.05$ are denoted in bold font; non-significant difference at $p> 0.05$; results stratified for school cluster effect.

5.3.3 Multiple variable logistic regression analyses

Multiple variable models were developed separately for students who had ever smoked cigarettes and students who had ever smoked WP, as defined in Chapter 3. Initial models were first developed for the known variables, excluding the religiosity variables. Then the additional impact of the religiosity variables was examined.

5.3.3.1 Final model excluding religiosity

Table 35 shows that the final multiple variable logistic regression model excluding religiosity of the set of variables statistically significantly associated with smoking (defined as having ever smoked a cigarette or WP).

5.3.3.1.1 Results for ever cigarette smoking

The results show that, among family and peer influences, having some friends or most/all friends smoke cigarettes compared to students have not friend smokes cigarette was associated with increase in the likelihood to smoke among those who had ever smoked cigarettes ($<.0001$). Having some friends or most/all friends smoke cigarettes were more likely to ever smoked cigarettes (OR=4.33; 95% CI 2.79, 6.72; OR=4.50; 95% CI 2.66, 7.63, respectively). The effect of having a parent smoke WP (OR=1.58; 95% CI 1.07, 2.35) was significantly associated with increased smoking of cigarettes in their children ($p<0.02$). The odds of a student smoking cigarettes increased if a member of their household was known to be a WP smoker (OR=1.71; 95% CI 1.14, 2.55; $p<0.009$).

5.3.3.1.2 Results for ever WP smoking

Compared to predictors of cigarette smoking among children, WP smoking was significantly associated with as many variables. These are listed in Table 35 and included “internet at home”, “friends smoke cigarettes”, “friends smoke WP”, “Parent smokes WP”, “Anyone in house smokes WP”, “parent upset if child smokes cigarette”, “parent upset if child smokes WP”, “parent have rules not to smoke WP” and “parents say OK if child under 16 smokes WP”.

Students who had friends who smoked cigarettes were associated with WP smoking as compared to students with non-smoking friends ($p < 0.0001$). The result was statistically significant where students had some cigarette-smoking friends (OR=2.18; 95% CI 1.36, 3.47) or where most/all of their friends who smoked cigarette (OR=3.48; 95% CI 1.86, 6.54) were cigarette smokers. Similarly, students who had friends who smoked WP were associated with WP smoking as compared to students with non-smoking friends ($p = 0.001$). The result was statistically significant where students had some friends who smoked WP (OR=2.08; 95% CI 1.33, 3.25) or where most/all of their friends smoked WP (OR=2.21; 95% CI 1.18, 4.14) were WP smokers.

Moreover, students who had a parent who smoked WP were more likely to smoke WP than students with parents who did not smoke WP, and the result was statistically significant (OR=3.34; 95% CI 2.33, 4.79; $p < 0.0001$). With respect to the other family smoking and peer characteristics, students who had anyone in the house who smokes WP were more likely to smoke WP than students who had not anyone in the house who smoked WP (OR=5.60; 95% CI 3.77, 8.33; $p < 0.0001$).

With regard to family attitude variables, students who thought that their parents would get upset if their children smoked cigarettes were associated with students who ever smoke WP ($p = 0.02$). Students who agreed that their parents would get upset if their

children smoked cigarettes were more likely to smoke WP than were students with parents who would not get upset if their child smoked cigarettes (OR=2.71; 95% CI 1.30, 5.61). Those who did not know how their parents would get upset if their child smoked cigarettes were more likely to smoke WP (OR=2.53; 95% CI 1.06, 6.04). Conversely, students who said their parents would get upset if their child smoked WP were associated with students who ever smoke WP as compared with students had parents who would not get upset if their child smoked WP ($p<0.0007$). Students who agreed that their parents would get upset if their child smoked WP were less likely to smoke WP than students with parents would not get upset if their child smoked WP (OR=0.28; 95% CI 0.14, 0.54).

In addition, students of parents who thought it was acceptable if children under 16 years smoked WP compared to students whose parents who thought it was not OK were associated with students who ever smoke WP ($p=0.02$). Students of parents who agreed that it's acceptable if children <16yrs smoke WP were more likely to smoke WP (OR=2.21; 95% CI 1.26, 3.90).

Furthermore, Students surveyed if their parents had rules about not smoking WP compared to students who had parents who did not have any rules about not smoking WP and it was associated with students who ever smoke WP ($p<0.0004$). Students who said their parents have rules about not smoking WP were less likely to smoke WP than were students whose parents did not have rules about smoking WP (OR=0.43; 95% CI 0.27, 0.66). However, those who did not know if their parents had rules about smoking WP were also less likely to smoke WP than were students with parents who did not have rules about not smoking WP (OR=0.47; 95% CI 0.27, 0.81). Students were also found to be less likely to smoke WP if they did not have internet at home (OR=0.57; 95% CI 0.39, 0.83; $p<0.003$).

Table 35. Multiple variable logistic regression model of variables significantly associated with student smoking (excluding religiosity) at baseline (N=926)

Variable	Level	Ever smoked cigarettes			Ever smoked WP		
		OR	95% CI	p-value*	OR	95% CI	p-value*
Wealth index / Internet at home	No	---	---	---	0.57	(0.39,0.83)	0.003
	Yes	---	---	---	1.00	---	
Friend smokes cigarette	None of them	1.00	---	<.0001	1.00	---	<.0001
	Some of them	4.33	(2.79,6.72)		2.18	(1.36,3.47)	
	Most/All of them	4.50	(2.66,7.63)		3.48	(1.86,6.54)	
Parents smokes WP	No	1.00	---	0.02	1.00	---	<.0001
	Yes	1.58	(1.07,2.35)		3.34	(2.33,4.79)	
Anyone in house smokes WP	No	1.00	---	0.009	1.00	---	<.0001
	Yes	1.71	(1.14,2.55)		5.60	(3.77,8.33)	
Friends smoke WP	None of them	---	---	---	1.00	---	0.001
	Some of them	---	---	---	2.08	(1.33,3.25)	
	Most/All of them	---	---	---	2.21	(1.18,4.14)	
Parents upset if child smokes cigarette	Agree	---	---	---	2.71	(1.30,5.61)	0.02
	Don't know	---	---	---	2.53	(1.06,6.04)	
	Disagree	---	---	---	1.00	---	
Parents upset if child smokes WP	Agree	---	---	---	0.28	(0.14,0.54)	0.0007
	Don't know	---	---	---	0.54	(0.24,1.20)	
	Disagree	---	---	---	1.00	---	
Parents have rules about not smoking WP	Agree	---	---	---	0.43	(0.27,0.66)	0.0004
	Don't know	---	---	---	0.47	(0.27,0.81)	
	Disagree	---	---	---	1.00	---	
Parents OK if child <16yrs smokes WP	Agree	---	---	---	2.21	(1.26,3.90)	0.02
	Don't know	---	---	---	0.90	(0.53,1.53)	
	Disagree	---	---	---	1.00	---	

*Notes.**Significant difference at $p \leq 0.05$ are denoted in bold font; non-significant difference at $p > 0.05$; results stratified for school cluster effect.

5.3.3.2 Final model including religiosity

Table 36 shows the final multiple variable logistic regression with the significant religiosity variables added as additional covariates to the model shown in Table 35.

Understanding of the ruling on smoking in Islam were associated with students who ever smoke cigarettes ($p < 0.008$). Cigarette smoking among students was statistically significantly higher in those who believed the Islamic ruling on smoking was that it was a desirable trait. These students were considerably more likely to smoke cigarettes than were students who chose “Forbidden” (OR=7.67; 95% CI 2.09, 28.1). No significant between “Discouraged” and “Forbidden”. Understanding of the ruling on smoking in Islam was not statistically significantly associated with WP smoking in children.

The religiosity variable of Belief was shown to be associated with increased WP smoking in students (OR=1.23; 95% CI 1.03, 1.48; $p < 0.03$). Conversely, the Devotion & Practice variable was significantly associated with students being less likely to be associated with both cigarette smoking (OR=0.81; 95% CI 0.73, 0.89; $p < 0.0001$) and WP smoking (OR=0.84; 95% CI 0.77, 0.93; $p < 0.0003$).

Examination of the variables carried over from the model presented in Table 35 shows that all the variables for ever WP smoking remained statistically significant. However, the variable of having parents or anyone else in the household smoking WP became non-significant for ever smoking cigarettes.

Table 36. Multiple variable logistic regression model of variables significantly associated with student smoking including religiosity at baseline (N=926)

Variable	Level	Ever smoked cigarettes			Ever smoked WP		
		OR	95% CI	p-value*	OR	95% CI	p-value*
Wealth index / Internet at home	No	---	---	---	0.58	(0.39,0.85)	0.006
	Yes	---	---	---	1.00	---	
Friends smoke cigarette	None of them	1.00	---	<.0001	1.00	---	
	Some of them	4.39	(2.79,6.90)		2.18	(1.36,3.49)	
	Most/All of them	4.35	(2.52,7.51)		3.74	(1.98,7.08)	
Parents smoke WP	No	1.00	---	0.10	1.00	---	<.0001
	Yes	1.41	(0.94,2.12)	3.26	(2.26,4.70)		
Anyone in house smoke WP	No	1.00	---	0.06	1.00	---	<.0001
	Yes	1.49	(0.98,2.26)	5.53	(3.70,8.26)		
Friends smoke WP	None of them	---	---	---	1.00	---	
	Some of them	---	---	---	1.96	(1.25,3.07)	0.004
	Most/All of them	---	---	---	2.12	(1.13,4.01)	
Parents upset if child smoke cigarette	Agree	---	---	---	2.51	(1.19,5.31)	
	Don't know	---	---	---	2.37	(0.98,7.74)	<0.05
	Disagree	---	---	---	1.00	---	
Parents upset if child smoke WP	Agree	---	---	---	0.28	(0.14,0.56)	
	Don't know	---	---	---	0.54	(0.24,1.22)	0.001
	Disagree	---	---	---	1.00	---	
Parents have rules not smoke WP	Agree	---	---	---	0.48	(0.31,0.74)	
	Don't know	---	---	---	0.49	(0.28,0.86)	0.003
	Disagree	---	---	---	1.00	---	
Parents ok if child <16yrs smokes WP	Agree	---	---	---	2.55	(1.43,4.55)	
	Don't know	---	---	---	0.91	(0.54,1.56)	0.005
	Disagree	---	---	---	1.00	---	
Ruling on smoking in Islam	Forbidden	1.00	---	0.008	---	---	---
	Discouraged	1.12	(0.70,1.78)				
	Desirable	7.67	(2.09,28.1)				
Belief	Don't know	1.67	(0.98,2.84)	---	---	---	
	---	---	---		---	1.23	(1.03,1.48)
Devotion & Practice	---	0.81	(0.73,0.89)	<.0001	0.84	(0.77,0.93)	0.0003

Notes. *Significant difference at $p \leq 0.05$ are denoted in bold font; non-significant difference at $p > 0.05$; results stratified for school cluster effect.

5.4 Summary

For both ever cigarette smoking and ever WP smoking, this model demonstrates that –after adjusting for many of the key confounding factors known to be associated with smoking for youth – religiosity is also associated with smoking for Muslim youth. These variables are associated with smoking in both the ever smoking cigarettes group and the ever smoking WP group. The associations were statistically significant (ranging from 0.0001 to 0.03).

With respect to the religiosity variables, this logistic regression model demonstrates that students who believed that smoking is desirable in Islam had the largest ORs for smoking cigarettes (sevenfold). The association is highly significant ($p < 0.008$). The model also predicts that religiosity through belief is a statistically significant predictor of WP smoking ($p < 0.03$). The model also predicts that religiosity through only Devotion & Practice is a statistically significant predictor of attitudes about both cigarette and WP smoking. The association is here is highly significant at $p < 0.0001$ and $p < 0.0003$, respectively. Therefore, the investigator rejects the null hypothesis that there is no relationship between religiosity and attitudes about smoking WP and cigarettes.

5.5 Discussion

This discussion first looks at main goals of the study and significance of the study, then at the main findings of the study overall.

Religiosity and tobacco use

There is evidence of an association between religious practice in Islam and smoking, with increased commitment in the former associated with decreased prevalence in the latter (Alzyoud et al., 2015). There may be scope to use this association in an educational intervention if two conditions are fulfilled: 1) some clearer evidence of association between increased religiosity and decreased smoking prevalence is produced, and 2) the associations between the several dimensions of religiosity and smoking are evaluated more specifically.

This is the first study that looked at the association between religiosity and prevalence of smoking cigarettes and/or WP among adolescents and a new valid questionnaire is developed. We examine the religiosity variables, where the final multiple variable model (Table 36) indicates that believing that in Islam smoking is desirable increases the likelihood of smoking cigarettes only by sevenfold. On the other hand, in this study students' understanding of the ruling on smoking in Islam was not significantly associated with WP smoking. This demonstrates the differences in perceptions of WP use and cigarette use, especially in relation to religion, and may pose challenges in two senses. Firstly, this shows that religion may not be sufficient alone as a health promotion avenue for smoking cessation messages for both WP and cigarettes. Secondly, WP smoking seems to be more of a concern in Middle Eastern countries, which tend to be Muslim, suggesting religiosity might be an effective strategy for health promotion messages.

Another concern is that the religiosity variable of Belief was shown to be associated with increased WP smoking in students (OR=1.23; 95% CI 1.03, 1.48; $p<0.03$). This is concerning because belief in religion was hypothesised to result in decrease of any type of smoking because of teachings in Islam. There was a significant association between increased belief and decreased cigarette smoking at simple model level. On the other hand, Belief was present in the final multivariate model, and associated with increased WP but not cigarette smoking. This suggests that students may believe that in Islamic scriptures WP smoking is not included as banned; and they may have a misconception of its cleanliness. This finding may be of importance to Imams to strengthen their efforts in the interpretation of WP smoking. This study is timely in the Jordanian context because recently in Jordan a *fatwa* was issued about WP smoking (Jordan General Iftaa' Department, 2017; Mufti Dr. Noah Ali Salman, 2010).

Another finding of special significance is that the religiosity variable of Devotion & Practice appeared to be effective in stopping or discouraging smoking of both WP and cigarettes. This might mean that more messages should be targeted to those who practice the religion less or those who show less devotion. Furthermore, it might mean examining the aspects of Devotion & Practice that are associated with smoking so that these can be factored into health promotion messages.

As for findings that can be extracted from the final multiple variable model including religiosity (Table 36), it can be seen that with respect to the religiosity variables the regression model does predict that believing that Islam considers smoking to be desirable increases the likelihood of smoking cigarettes only sevenfold. The association is highly significant ($p<0.008$). This finding suggests that making smoking *haram* might be an effective strategy for controlling cigarette smoking. It also suggests

that the interpretation of smoking as not *haram* may need to be reconsidered. New *fatwas* may need to be introduced that make smoking *haram*.

This is consistent with a study that found no evidence that Muslim adherents who believed smoking is prohibited or discouraged were any more interested in quitting (Yong et al., 2009). Previous studies have demonstrated that religious rulings alone are ineffective in reducing smoking rates, with patterns of smoking in Middle Eastern and North African countries largely unchanged following clear religious rulings prohibiting tobacco smoking (Hameed, Jalil, Noreen, Mughal, & Rauf, 2002; Radwan et al., 2003). This suggests that for religious rulings to be helpful, they need to be supported by a comprehensive set of policies to inform the public about the harm of smoking, thereby denormalising it and providing help for those who need it. Mere decrees are not enough.

The link between religious devotion has been established in previous studies (George, Ellison, & Larson, 2002; Gillum, 2005). The results of this study show that religiosity through only Devotion & Practice is a significant predictor of attitudes about both cigarette and WP smoking for both simple model association and the final multiple variable model. This is consistent with the literature indicating that this factor is linked to being more religious and being less likely to smoke (Alzyoud et al., 2015). This finding is important in terms of targeting health promotion messages to Muslims according to how devoted they are and the frequency of their practice. The results also have implications for the direction of further research into the aspects of Devotion & Practice (Gillum, 2005). Therefore, the investigator rejects the null hypothesis that there is no relationship between religiosity and attitudes about smoking WP and cigarettes.

Other factors and tobacco use

In terms of the demographic variables, the focus is on sex, age and daily pocket money. Examining sex, it can be seen that one of the strengths of this study is the balance of male and female students in the sample. This is important for two reasons: firstly, this study is about both cigarette and WP smoking, the prevalence rates of which are known to be different depending on smoking type and sex. A near equal distribution of students according to sex, as in this study, is therefore a strength. Secondly, it is important to have such a balanced sample because international trends demonstrate different patterns and trends for males and females in the epidemiology of smoking (Ng et al., 2014). Sex was significant at the simple model level with both cigarette and WP smoking, however it was not present in the multiple variable model. This is likely in part due to the stratification by school with some schools being single sex.

Furthermore, age and daily pocket money were significant at simple model level with WP smoking (and cigarette smoking for age). These variables were not significant with either WP or cigarette smoking at the multiple variable model level excluding the religiosity variables. As for daily pocket money, 58% of the students received more than half a dinar. By Jordanian standards, this means that the majority of students carried with them far much more than the average pocket money for students at that age, which is usually less than half a dinar. As noted, this variable was significant at the simple model stage with WP smoking but not cigarette smoking, however was not present in the multiple variable model, likely due to it being correlated with the wealth index variables. The law in Jordan prohibits selling cigarettes to those under the age of 18, but shop owners have rarely abided by the law. This may suggest that having more money may have encouraged the adolescents to initiate and maintain their smoking habit especially for WP. These results are consistent with studies that have

shown that higher daily pocket money for children is associated with smoking (Mzayek et al., 2011).

Similar to the demographic variables was the profile of the participants in terms of the wealth index. This study showed significant association of wealth index items (laptop, flat TV, dining room table, internet at home, cell phone, and sum of all) with WP smoking at simple model level, but no significance in the final multiple variable model including religiosity (except internet at home with WP smoking). Only having a dining room table was significant with both cigarette and WP smoking, but still at simple model level only. The results show significant associations between high wealth index and WP smoking for both simple model association and the final multiple variable model including religiosity. However, cigarette smoking was not found to be significantly associated with the wealth index. In summary, the wealth index variables appear to show that wealthier people tend to smoke WP. This could be because WP is seen as a step above cigarettes in terms of affordability. It could also mean that the activities that are associated with WP smoking tend to be those of wealthier people. Examples of such activities that are associated with WP smoking are coffee drinking in cafés and socialising with friends (Alzyoud et al., 2013). The wealth index results concur with existing evidence that affluence is associated with WP smoking (Anjum, Ahmed, & Ashfaq, 2008; Dugas, Tremblay, Low, Cournoyer, & O'Loughlin, 2010; Kawafha, 2014; Mzayek et al., 2011), which may be a direct result of the cost, openness and accessibility of WP smoking (Anjum et al., 2008). Although the literature on WP smoking and its relationship with wealth index is scarce, there is evidence that smoking cigarettes may be linked to affluence. However, in this result cigarette smoking was not found to be significantly associated with the wealth index.

These results contradict a Jordan-specific study which found that the poorest are more likely to smoke cigarettes than the richest (Toukan, 2016). Other studies, such as Laaksonen, Rahkonen, Karvonen, & Lahelma (2005), have found that those with lower incomes smoke more often than those with higher incomes. This was attributed to understanding of health promotion messages and having a greater sense of control, which tends to come with high education (and better wealth status). While greater wealth has positive effects on adults or parents, the results tend to be negative on their children. For example, one study carried out in Jordan found that higher parental incomes are associated with smoking among children. Studies that associate higher income with a likelihood to smoke among children tend to cite such reasons such as the influence of TV advertising, affordability of WP or cigarettes, and use of money as vehicle for joining peers (Kawafha, 2014). The wealth index variables results concur with current evidence that affluence and WP smoking is associated. For example, it was that found high socioeconomic groups were associated with WP smoking (Anjum et al., 2008) and higher incomes (Dugas et al., 2010; Kawafha, 2014). The effect of these influences tends to be more associated with WP smoking than cigarette smoking. This is because WP is a group activity while cigarette smoking is in most cases a solo activity. More explanations of this will be given in later sections.

In terms of family and peer smoking variables, we focused on the rates of smoking among students' parents. We found that 53% of fathers smoked cigarettes and 33% smoked WP; however only 7% of mothers smoked cigarettes and 12% smoked WP. This replicates the differences in sex by mode of smoking observed among the students themselves. The fact that such a small proportion of children reported that their mother smoked raises questions about the mothers' roles in influencing their children's smoking behaviour. The small number of mothers reported as smokers highlights

some of the potential sex differences and expectations that influences female and male youth smoking. There are opportunities for in-depth case studies to examine the phenomenon of families in which only the mother smokes. It has indeed been argued that a case study would be a good method in such research (Yin, 1994). In this instance, there are also new opportunities for learning about the role of fathers as role models for girls. This is because current studies on modelling smoking behaviour by parents have tended to focus on the role of fathers with respect to boys (Flay et al., 1994; Kandel & Wu, 1995).

Furthermore, in terms of parents' smoking this study's results show significant associations between students who have a parent who smokes WP, friends who smoke cigarettes, friends who smoke WP or anyone in the house who smokes WP with likelihood to smoke both WP and cigarettes at simple model level, and multiple variable level (in the model that excluded religiosity). In terms of the same variables, at multiple variable logistic regression level including the religiosity factors, the significance was only observed with WP smoking (except the variable of having friends who smoked cigarettes). This suggests that the religiosity factor has a mediating effect of discouraging or encouraging smoking of cigarettes by parents, family and friends, and at the same time a mediating effect of encouraging the smoking of WP by parents, family and friends. Furthermore, in the final multiple variable model that included religiosity factors, cigarette smoking was not found to be significantly associated with students who had parents that smoked cigarettes. The results of this study are consistent with evidence in the literature that there is a stronger association between children who have parents smoking and WP smoking than cigarette smoking (Mzayek et al., 2011).

Moreover, this study found that both WP smoking and cigarette smoking by family members or peers influences students to smoke. These results concur with the available evidence that family and peer influences of smoking are stronger in this age group (Simons-Morton, Haynie, Crump, Eitel, & Saylor, 2001; Wang, Fitzhugh, Westerfield, & Eddy, 1995). In terms of the influence of parents only, a number of studies have researched the role of parental smoking on children's smoking behaviour. One study found that parental smoking contributes to smoking initiation by their children even if parents either exclude their children in their smoking practices or have strict rules against smoking (Flay et al., 1994; Health Promotion Agency, 2014). The authors concluded that it is important for parents to stop or reduce their own smoking and to have very strict rules on smoking.

Another important aspect of this research is the social aspect of smoking for Muslim youth. The results demonstrate that cigarette smoking is most often a solo activity (36% smoked alone) whereas WP smoking is predominantly a group or social activity, with 45% reporting they usually smoked WP with other family members. The results show significant associations between students who had anyone in the house or friends who smoked WP with WP smoking, for both simple model association and the final multiple variable logistic regression model. However, cigarette smoking was not found to be significantly associated with students who had anyone in the house or friends who smoked cigarettes or WP in the final multiple variable model including religiosity. These findings are consistent with previous studies where adolescents used WP at home or at social gatherings among friends or family members (Alzyoud et al., 2013; Azab et al., 2010; Shadid & Hossain, 2013). The social aspect of WP smoking has also been noted by other scholars (Dar-Odeh et al., 2010; Maziak, Eissenberg, & Ward, 2005). In these studies, it was found that smoking in the family, especially WP,

promotes smoking habits as students reported being offered to smoke WP by friends and family members.

These findings therefore have implications for rethinking the role of family members and friends in smoking cessation messages. The results also suggest there is a need for more understanding of family structures that provide the base for this activity as well as need for a better understanding of smoking behaviour itself.

In terms of the family attitudes variables, what stood out was that all variables under this category, except “parents think it is ok if child<16 years smokes cigarettes”, were significantly associated with both WP and cigarette smoking at simple model level. However, at multiple variable model (excluding religiosity factors) none were retained for the cigarette smoking model, while all these variables, except “parents had rules not to smoke cigarettes”, were associated with WP smoking. All these variables were retained in the multiple variable model for smoking WP with religiosity included with minor modification of the odds ratios and 95% confidence intervals. The parent attitudes to WP were all in the expected direction with regards to ever smoking WP, with both; “parents have rules about not smoking WP” and “parents upset if their child smoked WP” being protective, whereas “parents think it’s OK for a child under 16 to smoke”) was a risk factor. In contrast, the one cigarette variable “parents upset if their child smoked cigarettes” was actually a risk factor for smoking WP, this leads to one interpretation that if parents are upset at their children smoking cigarettes they may encourage their children to smoke WP instead. This may be link to the fact that WP smoking is often part of family and social life, whereas cigarettes are often is a private activity.

In summary, what can be deduced from these results is that there is evidence pointing to the fact that certain parental attitudes, such as disapproval, were associated with

reduced likelihood to smoke WP. These findings are consistent with a previous study where adolescents who perceived that their parents would strongly disapprove of smoking were significantly less likely to smoke (Sargent & Dalton, 2001). However the mismatch between attitudes to WP and cigarette smoking does warrant further investigation.

These findings therefore suggest that the model developed for the factors of religiosity among children is a potentially useful instrument for measuring children's religiosity. It is believed that further testing of this instrument in a Muslim society and country-specific context could result in theoretical refinement of the scale. The tool can be considered as valid because the four factors maintained their factor structure and internal consistency when administered to children in Jordan. The model fits well for both WP smokers and cigarette smokers and gives confidence that the scale is measuring similar construct across WP and cigarette youth smoking behaviour. As for sex issues, there were no significant differences on scores between male and females. This suggests that the measure can be used effectively with both males and females. Good reliability of the scale was also seen in the internal consistency of the facet scales, with all above 0.70 (Chapter 4).

Chapter 6 : Quasi-longitudinal bivariate analyses of religiosity and other risk factors of tobacco use in Muslim youth

6.1 Introduction

This chapter examines the results of a pilot repeated cross-sectional survey which was conducted among Muslim school children enrolled in the 5th or 6th grade within the Irbid Governorate in the north of Jordan in 2015; and then again 1 year later in 2016. The focus here is on the association between religiosity and changes in prevalence of smoking cigarettes and WP among Muslim youth between two data collection. This is the first study to examine these associations using a modified multidimensional religiosity scale for Muslim school children in an Islamic society over 2 years. The development of the modified religiosity scale was reported in Chapter 4, and the research methodology was reported in Chapter 3.

We describe the analyses herein as quasi-longitudinal as the same populations were surveyed on both occasions with a majority of resurveyed participants. In that sense, the term *quasi-longitudinal* is used in a stronger sense than, e.g., Huang-Hickrod & Leonard (1980), in which no participant was surveyed more than once.

6.2 Statistical Methods

This chapter presents descriptive statistics from the aforementioned 2015-2016 repeated survey as well as fitted bivariate logistic regression quasi-longitudinal models.

6.2.1 Methods related to descriptive statistics

Descriptive analyses involved summarising data as the number and percentage of total participants in 2015 (N=926) and the total of participants in 2016 (N=888). The cohort study was stratified according to the identifiers “2015 only” (defined as the participants who participated in 2015 only); “Resurveyed participants” (defined as the participants surveyed in both 2015 and 2016); “2016 only” (defined as the participants who participated in 2016 only). Two marginal sets were also constructed: “Total 2015” (the union of “2015 only” and “Resurveyed participants) and “Total 2016” (the union of “2016 only” and resurveyed participants); all these terms were used in descriptive analysis.

The students surveyed in 2015 only (N=257) are considered attrited in 2016. Attrition was due to several factors, including students moving to other schools (for example, from public to private school) and parents not consenting to participation at follow-up. The students surveyed in 2016 only (N=219) were included in the prevalence analyses their characteristics compared to those of the attrited group.

In some cases, observed significance levels were computed to determine whether some changes between year and strata achieved statistical significance. These were computed using a 2-sample test for equality of proportions with continuity correction when strata were disjoint, using McNemar’s test when the same sample (resurveyed participants) was compared at two time points, and using the appropriate significance

results from a mixed weighted binomial regression model when there was overlap in the underlying samples (e.g. between years). All descriptive analyses were performed using SAS version 9.4 (copyright 2002-2012) and R version 3.3.3 (R Core Team, 2017).

6.2.2 Methods related to inferential statistics

In all cases the outcomes of interest are the indicators of having ever smoked cigarettes and having ever smoked the WP, fitted jointly. Factors of interest¹ were organised into thematic domains: demographic factors, wealth indicators, family and peer tobacco use, family attitudes to tobacco use, understanding of Islamic rulings on smoking, and religiosity. The broad alternative hypothesis guiding our modelling effort was that these factors of interest bore relationships to smoking that differed between smoking modalities (cigarette vs WP) and across the two years (2015 and 2016).

To test this hypothesis on the various factors of interest, modelling processes similar to those presented in Chapter 5 were carried out with some modifications: indicators of cigarette and WP use in 2015 and in 2016 were fitted jointly using mixed effects logistic regression by the introduction of a modality indicator with which factors can enter in interaction in the model, and which are linked by the inclusion of a common normal random effect under the link function for all observations obtained from the same participant. A random effect accounting for the school was also included in the single-factor models, described below. However the intraclass correlation coefficient for the school relative to the total variance in the full multi-factor model (described below) before the selection process was on the order of 0.03 (demonstrating minimal impact of school on the model), and the school random effect caused great numerical instability. This random effect was therefore not included in the multi-factor models. In a first analytical stage, the factors of interest were modelled one by one as follows: a three-way interaction of year, modality and factor of interest was first tested, and its

¹ The word “factor” in this Chapter is intended as a synonym for “categorical covariate”, not to be confused with the factors described by factor analysis.

odds ratio estimates presented if significant; otherwise the two two-way interactions of factor of interest and year, and factor of interest and modality, were also tested. Their corresponding odds ratio estimates were produced if significant, otherwise only the estimates corresponding to year and modality, regardless of the level of the factor of interest, were presented. In this way we could both test for heterogeneity of effect of the factor of interest on cigarette vs WP smoking, and for a change in the size of these effects across the two years, although in an otherwise unadjusted fashion. We call these models the single-factor bivariate models.

During a second analytical stage, a purposeful stepwise selection procedure (Bursac et al., 2008) was used to build a multi-factor bivariate models. Covariates (factors and their interactions) within each domain were considered for inclusion in the multi-factor model based on a pre-specified criterion of $p < 0.2$ in the fitted single-factor models. Initially, we developed multi-factor models for each thematic domain using stepwise selection processes to identify the best subset of covariates associated with the outcome variables. The resultant significant covariates were then brought together in a large model and underwent a stepwise selection processes to produce the final multi-factor bivariate model. Marginal odds ratio (OR) estimates and 95% confidence intervals (CIs) were reported; p -values of ≤ 0.05 were considered statistically significant. All inferential statistical analyses were performed using PROC GLIMMIX in SAS version 9.4 (copyright 2002-2012).

Some of the factors with more than two possible response categories were presented in their original categories for the descriptive analysis, but were collapsed into two or three categories for the inferential analyses due to small numbers in some categories. The variables for which some categories were aggregated in this way are presented in Appendix L.

Some variables had a high proportion of “do not know”, such as “Parent smokes cigarettes”, “Parent smokes WP”, “Anyone in the house smokes cigarettes”, “Anyone in the house smokes WP”, “Friends smoke cigarettes”, “Friends smoke WP”. In these cases the “do not know” category was included in the model. The following criteria were used to minimise the amount of missing data. For the wealth index, which is made up of 8 items, if a total of 3 missing items were found then the remaining 5 or more items were then scaled up to adjust for the missing items. For the 4 religiosity factors, if 1 missing item was present the rest were scaled up.

6.3 Results

6.3.1 Descriptive analyses

Table 37 shows the demographic characteristics not liable to change by year and

Table 38 shows the demographic characteristics liable to change.

6.3.1.1 Demographic characteristics not liable to change by year

Sociodemographic characteristics that were not liable to change by year are reported in Table 37. The number of resurveyed males was slightly higher than resurveyed females. On the other hand, there was an increase of 5 percentage points in female participants from “2015 only” to “2016 only”. The overall proportion for males was smaller than the overall proportion for females by 8 percentage points.

In 2015, overall 5th-graders and 6th-graders (referring to grade in 2015) were present in equal proportion, but in the “2015 only” stratum, 6th-graders exceeded 5th-graders by 30 percentage points, a situation that is partially reversed in “2016 only”. The proportion of participants from public schools in “2016 only” exceeded that in “2015 only” by 19 percentage points.

The proportion of resurveyed student who were Jordanian did not differ between “2015 only” and the resurveyed participants ($p=0.45$), but was significantly higher in the “2016 only” stratum ($p=0.002$). There were significantly fewer older children (12 and 13 or more) amongst those resurveyed ($p=0.003$).

Table 37. Sociodemographic characteristics that were not liable to change by year

Demographic variables	Level	2015 only (N=257)		Resurveyed participants (N=669)		2016 only (N=219)	
		N	%	N	%*	N	%*
Sex	Males	158	61%	346	52%	122	56%
	Females	99	39%	323	48%	97	44%
Grade in 2015	5th	91	35%	365	55%	121	55%
	6th	166	65%	304	45%	98	45%
School	Public -Male	80	31%	179	27%	57	26%
	Public -Female	58	23%	146	22%	34	16%
	Public-Female/Mixed	20	8%	125	19%	59	27%
	Public-Male	21	8%	75	11%	44	20%
	Private-Mixed	78	30%	144	22%	25	11%
Nationality	Jordanian	227	88%	604	90%	212	97%
	Non-Jordanian	30	12%	64	10%	7	3%
	Not reported	---	---	1	---	---	---
Age in 2015	Nine years and less	5	2%	18	3%	12	6%
	Ten years	50	19%	197	29%	58	27%
	Eleven years	112	44%	300	45%	92	43%
	Twelve years	69	27%	125	19%	54	25%
	Thirteen years and more	21	8%	29	4%	0	---
	Not reported	---	---	---	---	3	---
Total**		257	100%	669	100%	219	100%

Notes. *As a result of rounding, some percentages may not add up to 100%.

**3 non-Muslim students in each year.

6.3.1.2 Demographic characteristics liable to change by year

Table 38 shows sociodemographic characteristics liable to change by year. The proportion of participants living with both parents decreased by three percentage points between 2015 and 2016 ($p=0.002$). Among the resurveyed participants, the decrease was by a single percentage point but remained significant ($p=0.001$).

Students who carried less than half a dinar in 2015 constituted 42% of the sample, higher than the figure of 30% for 2016 ($p<0.0001$). Among the resurveyed participants, the decrease was by 13 percentage point and was significant ($p<0.0001$).

Changes were also observed in terms of education status. For example, those with fathers with education high school or lower were 4 percentage points more in proportion in 2015 compared to 2016 ($p=0.0003$). The resurveyed participants with

fathers with education high school or lower decreased by 3 percentage points in the same period and was significant ($p < 0.0001$). The same trend occurred with mother's education, where those with mothers with education high school or lower decreased by 6 percentage points between 2015 and 2016 ($p < 0.0001$). The phenomenon was similar in the resurveyed participants only, with decrease of 7 percentage points and was significant ($p < 0.0001$).

Table 38. Sociodemographic characteristics liable to change by year

Demographics variables	Level	2015						2016					
		2015 Only (N=257)		Resurveyed participants (N=669)		Total (N=926)		2016 Only (N=219)		Resurveyed participants (N=669)		Total (N=888)	
		N	%*	N	%*	N	%	N	%	N	%*	N	%
Live with	My Father and my Mother	248	96%	629	94%	877	95%	191	88%	617	93%	808	92%
	My Mother only	6	2%	34	5%	40	4%	18	8%	30	5%	48	5%
	My Father only	2	1%	5	1%	7	1%	2	1%	8	1%	10	1%
	Other	1	0	1	0	2	0	6	3%	11	2%	17	2%
	Not reported	---	---	---	---	---	---	2	---	3	---	5	---
Daily pocket money(JOD)**	less than quarter dinar (0.50 JOD)	26	10%	58	9%	84	9%	21	10%	49	7%	70	8%
	Quarter dinar to less than half of dinar	88	35%	217	33%	305	33%	45	21%	143	22%	188	22%
	Half dinar to less than 75 piasters	97	38%	292	44%	389	42%	90	43%	318	49%	408	47%
	75piasters to less than one dinar	25	10%	57	9%	82	9%	27	13%	75	11%	102	12%
	One dinar and more	19	7%	42	6%	61	7%	28	13%	69	11%	97	11%
Not reported	2	---	3	---	5	---	8	---	15	---	23	---	
Father's education	High school or less	158	62%	374	56%	532	58%	108	58%	326	53%	434	54%
	Diploma	32	13%	86	13%	118	13%	25	14%	95	15%	120	15%
	Bachelor	56	22%	173	26%	229	25%	37	20%	137	22%	174	22%
	Graduate (Master or PhD)	10	4%	31	5%	41	4%	15	8%	55	9%	70	9%
	Not reported	1	---	5	---	6	---	34	---	56	---	90	---
Mother's education	High school or less	152	59%	379	57%	531	58%	105	56%	305	50%	410	52%
	Diploma	40	16%	92	14%	132	14%	29	15%	108	18%	137	17%
	Bachelor	56	22%	156	23%	212	23%	36	19%	143	24%	179	23%
	Graduate (Master or PhD)	8	3%	40	6%	48	5%	18	10%	48	8%	66	8%
	Not reported	1	---	2	---	3	---	31	---	65	---	96	---
Total		257	100%	669	100%	926	100%	219	100%	669	100%	888	100%

Note. *As a result of rounding, some percentages may not add up to 100%.

**1 JOD=NZ \$2.

In terms of the wealth index, particular comparisons are shown in Table 39. The proportion of participants who had 5 items decreased by three percentage points between 2015 and 2016 ($p=0.01$). In the resurveyed participants, the decrease was by three percentage point and was significant ($p<0.0001$).

The proportion of participants who had 6 items increased by 10 percentage points between 2015 and 2016 ($p=0.003$). Similarly, among the resurveyed participants, the increase was by 10 percentage point and was significant ($p<0.0001$).

Those who owned 3 items decreased by 4 percentage points between 2015 and 2016 ($p=0.004$). Among the resurveyed participants, the decrease was by three percentage point and was significant ($p<0.0001$). There were very few students who owned 1, 2 items.

This suggests most students fell in the middle, with relatively few very poor and very rich students. Comparing 2015 only participants with the 2016 only participants it can be seen that again the only difference was in the participants who owned 6 items, increased by 10 percentage points between 2015 and 2016.

In terms of explanations for the above changes, it must be noted that having such items as cell phones and the internet is expected to increase each year as a sign of society adopting new technology. On the other hand, ownership of items such as houses and having a maid and dining table may be dependent on the country's economy and net income of workers.

Table 39. *Wealth index characteristics by year*

Total wealth index	Level	2015						2016					
		2015 only (N=257)		Resurveyed participants (N=669)		Total (N=926)		2016 only (N=219)		Resurveyed participants (N=669)		Total (N=888)	
		N	%*	N	%	N	%*	N	%	N	%	N	%
	0	2	1%	1	0	3	0	---	---	1	0	1	0
	1	7	3%	3	0	10	1%	2	1%	11	2%	13	2%
	2	10	4%	36	5%	46	5%	13	6%	23	4%	36	4%
	3	34	13%	66	10%	100	11%	20	10%	40	7%	60	7%
Number of items	4	31	12%	111	17%	142	15%	25	12%	96	16%	121	15%
	5	73	29%	158	24%	231	25%	48	24%	131	21%	179	22%
	6	74	29%	220	33%	294	32%	78	39%	264	43%	342	42%
	7	20	8%	57	9%	77	8%	16	8%	46	7%	62	8%
	8	5	2%	11	2%	16	2%	---	---	3	0	3	0
	Not reported	1	---	6	---	7	---	17	---	54	---	71	---
Total wealth index		257	100%	669	100%	926	100%	219	100%	669	100%	888	100%

Note. *As a result of rounding, some percentages may not add up to 100%.

6.3.1.3 Males who had ever smoked tobacco

Table 40 shows males who had ever smoked tobacco. The proportion of males who answered “Yes” to ever smoking cigarettes increased by 13 percentage points between 2015 and 2016 ($p < 0.0001$). Among the resurveyed participants, the increase was by 15 percentage point and was significant ($p < 0.0001$).

Meanwhile, the proportion of males who answered “Yes” to ever smoking WP increased by 12 percentage points between 2015 and 2016 ($p < .001$). The resurveyed male participants who answered “Yes” to ever smoking WP increased by 13 percentage point and was significant ($p < 0.0001$).

Table 40. *Males who had ever smoked tobacco by modality and year*

Male ever smoker	Level	2015						2016					
		2015 only (N=158)		Resurveyed participants (N=346)		Total (N=504)		2016 only (N=122)		Resurveyed participants (N=346)		Total (N=468)	
		N	%	N	%	N	%	N	%	N	%	N	%
Ever smoked cigarettes	No	120	76%	285	82%	405	81%	85	70%	232	67%	317	68%
	Yes	37	24%	61	18%	98	19%	37	30%	113	33%	150	32%
	Not reported	1	---	---	---	1	---	---	---	1	---	1	---
Ever smoked WP	No	87	56%	222	64%	309	62%	56	47%	175	51%	231	50%
	Yes	69	44%	124	36%	193	38%	62	53%	167	49%	229	50%
	Not reported	2	---	---	---	2	---	4	---	4	---	8	---
Total		158	100%	346	100%	504	100%	122	100%	346	100%	468	100%

6.3.1.4 Females who had ever smoked tobacco

Table 41 shows females who had ever smoked tobacco. The proportion of females who answered “Yes” to ever smoking cigarettes increased by 6 percentage points between 2015 and 2016 ($p=0.02$). Among the resurveyed participants, the increase was by 4 percentage point in the same period and was significant ($p<0.001$).

Meanwhile, the proportion of females who answered “Yes” to ever smoking WP increased by 11 percentage points between 2015 and 2016 ($p<0.001$). The resurveyed female participants who answered “Yes” to ever smoking WP increased by 16 percentage point in the same period and was significant ($p<0.0001$).

Table 41. *Females who had ever smoked tobacco by modality and year*

Female ever smoker	Level	2015						2016					
		2015 only (N=99)		Resurveyed participants (N=323)		Total (N=422)		2016 only (N=97)		Resurveyed participants (N=323)		Total (N=420)	
		N	%	N	%	N	%	N	%	N	%	N	%
Ever smoked cigarettes	No	90	91%	289	89%	379	90%	80	82%	272	85%	352	84%
	Yes	9	9%	34	11%	43	10%	17	18%	48	15%	65	16%
	Not reported	---	---	---	---	0	---	---	---	3	---	3	---
Ever smoked WP	No	54	55%	230	71%	284	67%	54	56%	177	55%	231	56%
	Yes	45	45%	93	29%	138	33%	42	44%	143	45%	185	44%
	Not reported	---	---	---	---	0	---	1	---	3	---	4	---
Total		99	100%	323	100%	422	100%	97	100%	323	100%	420	100%

6.3.1.5 Ruling on smoking in Islam by year

Table 42 presents the results for participants' understanding of the ruling on smoking in Islam. The proportion of those who thought it was forbidden dropped by 7 percentage points between 2015 and 2016 ($p=0.001$). The phenomenon was similar in the resurveyed participants, with decrease of 7 percentage points and was significant ($p=0.0001$). Meanwhile, the proportion of those who thought it was discouraged increased by 6 percentage points between 2015 and 2016 ($p=0.03$). The phenomenon was similar in the resurveyed participants who thought it was discouraged increased by 6 percentage points between 2015 and 2016 and was significant ($p<0.0001$).

Table 42. Understanding of ruling on smoking in Islam by year

Understanding of ruling of smoking in Islam	2015						2016					
	2015 only (N=257)		Resurveyed participants (N=669)		Total (N=926)		2016 only (N=219)		Resurveyed participants (N=669)		Total (N=888)	
	N	%	N	%	N	%	N	%	N	%	N	%*
Forbidden (<i>Haram</i>)	115	45%	306	46%	421	46%	80	38%	255	39%	335	39%
Discouraged (<i>Makruh</i>)	80	31%	235	35%	315	34%	82	39%	265	41%	347	40%
Desirable	5	2%	8	1%	13	1%	2	1%	10	2%	12	1%
Don't know	55	22%	117	18%	172	19%	45	22%	119	18%	164	19%
Not reported	2	---	3	---	5	---	10	---	20	---	30	---
Total	257	100%	669	100%	926	100%	219	100%	669	100%	888	100%

Note. *As a result of rounding, some percentages may not add up to 100%.

6.3.1.6 Family and peer cigarette smoking by year

Family and peer smoking of cigarettes was another area where students were surveyed at baseline in 2015 and resurveyed in 2016 (see Table 43). The proportion of participants having any of their parents smoked cigarettes decreased slightly by 3 percentage points between 2015 and 2016 ($p < 0.0001$). Among the resurveyed participants, the decrease was by 17 percentage point and was significant ($p < 0.0001$).

Students were also asked if anyone smoked cigarettes in the house. The proportion of participants having anyone in house smokes cigarettes increased slightly by 2 percentage points between 2015 and 2016, which did not achieve statistical significance ($p = 0.10$). Among the resurveyed participants, the increase was by 5 percentage point and was significant ($p < 0.0001$).

With regard to whether students had a friend(s) who smoked cigarettes, the proportion of participants having friend(s) who smoked cigarettes increased by 6 percentage points between 2015 and 2016, which did not achieve statistical significance ($p = 0.27$). Among the resurveyed participants, the increase was by 2 percentage point and was significant ($p = 0.0001$).

Table 43. Family and peer cigarette smoking by year

Family and peer cigarette smoking	Level	2015						2016					
		2015 only (N=257)		Resurveyed participants (N=669)		Total (N=926)		2016 only (N=219)		Resurveyed participants (N=669)		Total (N=888)	
		N	%*	N	%*	N	%	N	%	N	%	N	%
Parents smoke cigarettes	None	99	39%	311	47%	410	45%	98	50%	411	62%	394	48%
	Father only	126	49%	303	46%	429	47%	77	39%	155	23%	362	44%
	Mother only	6	2%	12	2%	18	2%	6	3%	17	3%	19	2%
	Both	17	7%	33	5%	50	5%	13	7%	65	10%	45	5%
	I don't know	7	3%	5	1%	12	1%	2	1%	15	2%	5	1%
	Not reported	2	---	5	---	7	---	23	---	6	---	63	---
Anyone in house smokes cigarettes	No	191	75%	509	77%	700	76%	152	73%	482	72%	620	74%
	Yes	64	25%	154	23%	218	24%	56	27%	183	28%	222	26%
	Not reported	2	---	6	---	8	---	11	---	4	---	46	---
Close friends smoke cigarettes	None of them	172	68%	475	72%	647	71%	129	64%	457	69%	545	65%
	Some of them	51	20%	123	19%	174	19%	39	19%	130	20%	155	18%
	Most of them	21	8%	44	7%	65	7%	30	15%	47	7%	102	12%
	All of them	8	3%	19	3%	27	3%	4	2%	26	4%	40	5%
	Not reported	5	---	8	---	13	---	17	---	9	---	46	---
Total		257	100%	669	100%	926	100%	219	100%	669	100%	888	100%

Note. *As a result of rounding, some percentages may not add up to 100%.

6.3.1.7 Family and peer WP smoking by year

Another area of interest was family and peer WP smoking, as shown in Table 44. The proportion of participants having any of their parents smoked WP slightly increased by 2 percentage points between 2015 and 2016, which did not achieve statistical significance ($p=0.83$). Among the resurveyed participants, the increase was by a single percentage point but remained significant ($p=0.02$).

Students were also asked if anyone smoked WP in the house. The proportion of participants having anyone in house smokes WP increased by 6 percentage points between 2015 and 2016 ($p=0.049$). Similarly, among the resurveyed participants, the increase was by 6 percentage point and was significant ($p\leq.0001$).

With regard to whether students had a friend(s) who smoked WP, the proportion of participants having friend(s) who smoked WP increased by 12 percentage points between 2015 and 2016 ($p\leq.0001$). Similarly, among the resurveyed participants, the increase was by 12 percentage point and was significant ($p<0.0001$).

Table 44. Family and peer WP smoking by year

Family and peer WP smoking	Level	2015						2016					
		2015 only (N=257)		Resurveyed participants (N=669)		Total (N=926)		2016 only (N=219)		Resurveyed participants (N=669)		Total (N=888)	
		n	%*	n	%	n	%	n	%	n	%*	n	%*
Parents smoke WP	None	165	65%	411	62%	576	63%	128	61%	390	60%	518	61%
	Father only	58	23%	155	23%	213	23%	43	21%	158	24%	201	23%
	Mother only	12	5%	17	3%	29	3%	13	6%	19	3%	32	4%
	Both	17	7%	65	10%	82	9%	15	7%	67	10%	82	10%
	I don't know	3	1%	15	2%	18	2%	10	5%	13	2%	23	3%
	Not reported	2	---	6	---	8	---	10	---	22	---	32	---
Anyone in house smokes WP	No	179	70%	482	72%	661	72%	135	66%	429	66%	563	66%
	Yes	76	30%	183	28%	259	28%	69	34%	217	34%	287	34%
	Not reported	2	---	4	---	6	---	15	---	23	---	38	---
Close friend smokes WP	None of them	164	65%	457	69%	621	68%	119	57%	369	57%	488	57%
	Some of them	59	23%	130	20%	189	21%	56	27%	154	24%	210	25%
	Most of them	19	8%	47	7%	66	7%	15	7%	67	10%	82	10%
	All of them	11	4%	26	4%	37	4%	18	9%	59	9%	77	9%
	Not reported	4	---	9	---	13	---	11	---	20	---	31	---
Total		257	100%	669	100%	926	100%	219	100%	669	100%	888	100%

Note. *As a result of rounding, some percentages may not add up to 100%.

6.3.1.8 Family attitudes to smoking cigarettes by year

Table 45 shows that family's attitude to cigarette smoking, the proportion of participants who agreed that their parents would be upset if they smoked cigarettes slightly decreased by 2 percentage points between 2015 and 2016, which did not achieve statistical significance ($p=0.06$). In the resurveyed participants, the decrease was by 3 percentage point and was significant ($p<0.0001$).

Students were also surveyed about their parents if they set specific rules about not smoking cigarettes. The proportion of participants who agreed that their parents set specific rules about not smoking cigarettes slightly decreased by a single percentage point, which did not achieve statistical significance ($p=0.16$). Similar change was seen in the resurveyed participants, the decrease was by 2 percentage point and was significant ($p<0.0001$).

The proportion of participants who agreed that their parents thought it was acceptable for children under 16 to smoke cigarettes decreased by 2 percentage points between 2015 and 2016, which did not achieve statistical significance ($p=0.09$). A similar change was observed in the resurveyed participants; the decrease was by 2 percentage point ($p=0.003$).

Table 45. Family attitudes to smoking cigarettes

Family attitudes to smoking cigarettes	Level	2015						2016					
		2015 only (N=257)		Resurveyed participants (N=669)		Total (N=926)		2016 only (N=219)		Resurveyed participants (N=669)		Total (N=888)	
		N	%*	N	%*	N	%	N	%	N	%*	N	%
Parents upset if the child smoke cigarettes	Agree	178	69%	510	76%	688	74%	148	70%	477	73%	625	72%
	Don't know	42	16%	96	14%	138	15%	35	17%	109	17%	144	17%
	Disagree	37	14%	61	9%	98	11%	28	13%	69	11%	97	11%
	Not reported	---	---	2	---	2	---	8	---	14	---	22	---
Parents set specific rules for not smoking cigarettes	Agree	140	54%	372	56%	512	55%	113	54%	349	54%	462	54%
	Don't know	50	19%	143	21%	193	21%	50	24%	151	23%	201	23%
	Disagree	67	26%	151	23%	218	24%	47	22%	148	23%	195	23%
	Not reported	---	---	3	---	3	---	9	---	21	---	30	---
Parents think it's OK for people under 16 to smoke cigarettes	Agree	30	12%	65	10%	95	10%	17	8%	54	8%	71	8%
	Don't know	39	15%	106	16%	145	16%	32	15%	131	20%	163	19%
	Disagree	188	73%	496	74%	684	74%	160	77%	469	72%	629	73%
	Not reported	---	---	2	---	2	---	10	---	15	---	25	---
Total		257	100%	669	100%	926	100%	219	100%	669	100%	888	100%

Note. *As a result of rounding, some percentages may not add up to 100%.

6.3.1.9 Family attitudes to WP smoking by year

Table 46 shows that family's attitude to WP smoking, the proportion of participants who agreed that their parents would be upset if they smoked WP decreased by 5 percentage points between 2015 and 2016 ($p=0.002$). Among the resurveyed participants, the decrease was by 7 percentage point and was significant ($p<0.0001$).

Students were also surveyed about whether their parents set specific rules about not smoking WP. The proportion of participants who agreed that their parents set specific rules about not smoking WP decreased by 4 percentage point ($p=0.03$). Similar change was seen in the resurveyed participants, the decrease was by 5 percentage point and was significant ($p<0.0001$).

In terms of students views about parents thinking that its acceptable for people under 16 to smoke WP, the proportion of participants who agreed that their parents thought it was acceptable for children under 16 to smoke WP slightly decreased by a single percentage point, which did not achieve statistical significance ($p=0.35$). Among resurveyed participants, the increase was by a single percentage point but remained not significant ($p= 0.25$).

Table 46. Family attitudes to smoking WP by year

Family attitudes to WP smoking	Level	2015						2016					
		2015 only (N=257)		Resurveyed participants (N=669)		Total (N=926)		2016 only (N=219)		Resurveyed participants (N=669)		Total (N=888)	
		N	%	N	%	N	%	N	%*	N	%*	N	%*
Parents upset if child smokes WP	Agree	167	65%	472	71%	639	69%	133	64%	419	64%	552	64%
	Don't know	47	18%	92	14%	139	15%	35	17%	112	17%	147	17%
	Disagree	43	17%	103	15%	146	16%	41	20%	119	18%	160	19%
	Not reported	---	---	2	---	2	---	10	---	19	---	29	---
Parents set specific rules about not smoking WP	Agree	131	51%	349	52%	480	52%	108	52%	306	47%	414	48%
	Don't know	50	19%	151	23%	201	22%	44	21%	160	25%	204	24%
	Disagree	76	30%	166	25%	242	26%	56	27%	186	29%	242	28%
	Not reported	---	---	3	---	3	---	11	---	17	---	28	---
Parents think it's OK for people under 16 to smoke WP	Agree	41	16%	72	11%	113	12%	21	10%	75	12%	96	11%
	Don't know	44	17%	127	19%	171	19%	25	12%	124	19%	149	17%
	Disagree	172	67%	468	70%	640	69%	162	78%	452	69%	614	71%
	Not reported	---	---	2	---	2	---	11	---	18	---	29	---
Total		257	100%	669	100%	926	100%	219	100%	669	100%	888	100%

Note. *As a result of rounding, some percentages may not add up to 100%.

6.3.2 Single-factor bivariate logistic regression analyses

The values presented in the tables in the following sections require some explanation as they are summarising complex logistic models with interaction terms, Table 47 below presents a template to assist with interpretation.

The factor of interest (FOI) W is a three category response variable, the resultant odds ratios A and B relate to the main effects of FOI W with reference to category 3 with regards to smoking overall (marginal across years 2015 and 2016 as well as modalities WP and cigarette). Marginal odds ratio are defined as the exponential of the log odds ratio averaged over the relevant terms such as interaction levels, with equal weighting given to each level. The corresponding 95% confidence interval for A is (Al, Au) denoting the lower and upper confidence limits. There is no significant FOI by year interaction or FOI by modality as evidenced by non-significant p-values ($p > 0.05$) therefore a single odds ratio is produced regardless of the categories of W. Odds ratio C represents the odds ratio comparing year 2016 to 2015, whereas odds ratio G represents the odds ratio comparing WP to cigarette.

The FOI X is equivalent to W with regards to main effects, however there are statistically significant interaction terms. Marginal odds ratios D, E and F compare year 2016 with 2015 for each of the three levels of X. Similarly H, I, J compare WP with cigarette for each of the three levels.

The continuous FOI Y produces a single marginal odds ratio K for the FOI main effect per unit increase. There is no significant FOI by year interaction or FOI by modality as evidenced by non-significant p-values ($p > 0.05$) therefore a single odds ratio is produced per unit increase. The continuous Z is equivalent to Y with regards to main effects, however with the significant FOI and modality interaction separate marginal

odds ratios per unit increase are produced for WP and cigarette and are detailed in footnote.

Table 47. Template for results

Factor of Interest (FOI)	Level	FOI Main effect		FOI*Year (2016 to 2015)		FOI*Modality (WP to cigarette)	
		OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
W	1	A (Al, Au)	p	C (Cl, Cu)	p>0.05	G (Gl, Gu)	p>0.05
	2	B (Bl, Bu)					
	3 (ref)	1.00 -					
X	1	A (Al, Au)	p	D (Dl, Du)	p≤0.05	H (Hl, Hu)	p≤0.05
	2	B (Bl, Bu)		E (El, Eu)		I (Il, Iu)	
	3 (ref)	1.00 -		F (Fl, Fu)		J (Jl, Ju)	
Y	Cts (per unit)	K (Kl, Ku)	p	L (Ll, Lu)	p>0.05	M (Ml, Mu)	p>0.05
Z	Cts (per unit)	K (Kl, Ku)	p	L (Ll, Lu)	p>0.05	*	p≤0.05

Footnote * WP N (Nl, Nu) and Cigarettes O (Ol, Ou)

Participants surveyed in 2015 only: 257; in 2016 only: 219; in both years: 669.

6.3.2.1 Demographics

Table 48 shows that the unadjusted ORs for the single-factor model, which identified significant associations among the sociodemographic variables with those who had ever smoked either cigarettes or WP by year. The demographic variables of sex, grade, nationality, living with parents, age, pocket money, father's education, mother's education were surveyed, and only three showed statistically significant results, as can be seen in Table 48. There is a statistically significant interaction between sex and modality ($p=0.0003$). Female smokers were considerably more likely to smoke WP than cigarettes (OR=9.64; 95% CI 6.60, 14.1). Male smokers were more likely to smoke WP than cigarettes (OR=4.04; 95% CI 2.95, 5.53). However, males were more likely to be smokers (WP or cigarette) than females (OR=2.37; 95% CI 1.68, 3.34); a result that is statistically significant ($p<0.0001$). Another statistically significant interaction was between pocket money and modality ($p=0.003$). Students who received daily pocket money of less than 0.50 JOD were more likely to smoke WP than cigarettes (OR=3.65; 95% CI 2.61, 5.11). Students who received daily pocket money of more than 0.50 JOD, meanwhile, were more likely to smoke WP than cigarettes (OR=6.85; 95% CI 5.25, 8.94). However, Students who received daily pocket money of less than 0.50 JOD were less likely to smoke (WP or cigarette) than those who had more than 0.50 JOD (OR=0.74; 95% CI 0.56, 0.99). Furthermore, on the other demographic characteristics, age were statistically associated with smoking (WP or cigarette) ($p=0.006$) with regards to smoking. Twelve-year-old students were more likely to smoke (WP or cigarette) than 10 year olds (OR=2.06; 95% CI 1.32, 3.20), similar to 13-year-olds or more were more likely to smoke (WP or cigarette) than students at 10 years (OR=2.48; 95% CI 1.14, 5.36). There was no statistically significant interaction between any demographic variable and year.

Table 48. *Estimated effect of individual demographics as predictors of smoking by year and modality*

Factor of interest (FOI)	Level	FOI Main effect			FOI*Year (2016 to 2015)			FOI*Modality (WP to cigarette)		
		OR	95% CI	p-value*	OR	95% CI	p-value*	OR	95% CI	p-value*
Sex	Male	2.37	(1.68,3.34)	<.0001	2.45	(1.90,3.14)	0.68	4.04	(2.95,5.53)	0.0003
	Female	1.00	---					9.64	(6.60,14.1)	
Grade	5th	1.00	---	0.09	2.46	(1.76,3.44)	0.79	5.91	(4.26,8.21)	0.52
	6th	1.31	(0.96,1.81)							
Nationality	Jordanian	1.00	---	0.33	2.43	(1.77,3.34)	0.76	5.88	(4.30,8.05)	0.49
	Non-Jordanian	0.76	(0.44,1.32)							
Live with both parents	No	1.32	(0.77,2.27)	0.31	2.40	(1.74,3.30)	0.40	5.97	(4.35,8.18)	0.97
	Yes	1.00	---							
Age	9 years and less	1.79	(0.72,4.46)	0.006	2.46	(1.99,3.03)	0.61	5.55	(4.48,6.88)	0.06
	10 years	1.00	---							
	11 years	1.20	(0.82,1.73)							
	12 years	2.06	(1.32,3.20)							
	13 years and more	2.48	(1.14,5.36)							
Daily pocket money**	< 0.50 JOD	0.74	(0.56,0.99)	0.04	2.36	(1.90,2.93)	0.48	3.65	(2.61,5.11)	0.003
	≥ 0.50 JOD	1.00	---					6.85	(5.25,8.94)	
Father's education	≤ High school	1.00	---	0.10	2.59	(2.07,3.23)	0.19	5.79	(4.62,7.25)	0.23
	> High school	0.79	(0.59,1.05)							
Mother's education	≤ High school	1.00	---	0.33	2.57	(2.06,3.21)	0.37	5.72	(4.58,7.16)	0.72
	> High school	0.87	(0.66,1.15)							

Note. *Significant difference at $p \leq 0.05$ are denoted in bold font; non-significant difference at $p > 0.05$; result account for school cluster effect and ID.

**1 JOD=NZ\$2.

Participants surveyed in 2015 only: 257; in 2016 only: 219; in both years: 669.

6.3.2.2 Wealth indicator variables

Table 49 shows that the unadjusted ORs for the single-factor model, which identified significant associations between owning items in the wealth index variables and those who had ever smoked either cigarettes or WP by year. A statistically significant interaction was found between wealth index per unit and modality ($p=0.0002$). Wealthy students were more likely to smoke WP, the more items on the wealth index they owned (OR=1.33; 95% CI 1.19, 1.49), but the wealth index was not statistically significant for smoking cigarettes (OR=1.02; 95% CI 0.90, 1.16). It was also found that the higher the wealth index, the greater the likelihood of smoking (WP or cigarette) (OR=1.17; 95% CI 1.06, 1.28). The result was statistically significant ($p<0.001$).

Table 49. Estimates of effect of individual wealth index as predictors of smoking by year and modality

Factor of interest (FOI)	Level	FOI Main effect			FOI*Year (2016 to 2015)			FOI*Modality (WP to cigarette)		
		OR	95% CI	p-value*	OR	95% CI	p-value*	OR	95% CI	p-value*
Laptop	No	0.85	(0.63,1.15)	0.30	2.45	(1.77,3.40)	0.10	5.88	(4.27,8.09)	0.08
	Yes	1.00	---							
Flat TV	No	0.72	(0.46,1.11)	0.14	2.41	(1.75,3.31)	0.75	3.14	(1.62,6.08)	0.04
	Yes	1.00	---							
Dining room table	No	0.77	(0.57,1.04)	0.09	3.56	(2.15,5.88)	0.02	5.93	(4.37,8.06)	0.16
	Yes	1.00	---							
Internet at home	No	0.91	(0.68,1.22)	0.53	2.38	(1.74,3.25)	0.33	3.57	(2.35,5.42)	0.0009
	Yes	1.00	---							
Cell Phone	No	0.43	(0.27,0.68)	0.0004	2.44	(1.77,3.37)	0.83	5.95	(4.33,8.18)	0.14
	Yes	1.00	---							
Microwave	No	0.58	(0.43,0.79)	0.0005	2.41	(1.76,3.29)	0.44	5.98	(4.39,8.16)	0.27
	Yes	1.00	---							
A maid	No	0.99	(0.60,1.64)	0.98	2.42	(1.76,3.34)	0.91	5.96	(4.35,8.17)	0.28
	Yes	1.00	---							
House rented	No	1.00	(0.74,1.35)	0.97	2.43	(1.75,3.37)	0.62	5.76	(4.18,7.94)	0.45
	Yes	1.00	---							
Total number of items**	per unit	1.17	(1.06,1.28)	0.001	2.36	(1.91,2.92)	0.20	See footnote †		0.0002

Note. *Significant difference at $p \leq 0.05$ are denoted in bold font; non-significant difference at $p > 0.05$; result account for school cluster effect and ID.

** Number of items ranges from 0 to 8.

†Modality-specific odds ratios and 95% confidence intervals: Cigarette 1.02 (0.90, 1.16), WP 1.33 (1.19, 1.49).

Participants surveyed in 2015 only: 257; in 2016 only: 219; in both years: 669.

6.3.2.3 Family and peer smoking

Table 50 shows that the associations between family and peer smoking and students having ever smoked cigarettes or WP by year.

There was a statistically significant interaction with parents smoking cigarettes and modality ($p=0.03$). Students who said their parents smoked cigarettes were considerably more likely to smoke WP than cigarettes (OR=6.77; 95% CI 5.08, 9.02), while the students who said their parents did not smoke cigarettes were more likely to smoke WP than cigarettes (OR=5.05; 95% CI 3.67, 6.93). Parents smoking cigarettes and year was also statistically significant ($p=0.01$). Students who said their parents smoked cigarettes were more likely to smoke (WP or cigarette) in 2016 than 2015 (OR=2.80 95% CI 2.09, 3.77). However, Students who said their parents smoked cigarettes were more likely to smoke (WP or cigarettes) than students who said their parents did not (OR=2.33, 95% CI 1.73, 3.13).

There was a statistically significant interaction with parents smoking WP and modality ($p<0.0001$). Students who said their parents smoked WP were considerably more likely to smoke WP than cigarettes (OR=11.5; 95% CI 8.10, 16.3), while those who said their parents did not were more likely to smoke WP than cigarettes (OR=3.56; 95% CI 2.71, 4.66). Those who said “Do not know” were considerably more likely to smoke WP than cigarettes (OR=6.01; 95% CI 2.39, 15.1). However, participants were more likely to smoke (WP or cigarettes) if they have parents smoked WP (OR=4.32; 95% CI 3.23, 5.77).

Participants were also surveyed about whether anyone in their house smoked cigarettes. It was found that those with someone smoking cigarettes in the house were more likely to be smokers (WP or cigarette) than those without no one in the house

who smoked cigarettes (OR=3.26 95% CI 2.42, 4.38). Those who said “Do not know” were more likely to be smokers (WP or cigarette) than those without no one in the house who smoked cigarettes (OR=2.24; 95% CI 1.12, 4.46). The result that is statistically significant ($p<0.0001$). There was no statistically significant interaction between anyone in house smoked cigarettes with year or modality.

There was a statistically significant interaction with anyone in the house smoked WP and modality ($p<0.0001$). It was found that those who said “Yes” were considerably more likely to smoke WP than cigarettes (OR=17.2; 95% CI 11.7, 25.2), while those who said “No” were more likely to smoke WP than cigarettes (OR=3.35; 95% CI 2.59, 4.32). However, those who said “Yes” were considerably more likely to be smokers (WP or cigarette) than who said “No” (OR=6.02; 95% CI 4.55, 7.98; a result that is statistically significant ($p<0.0001$). There was no statistically significant interaction between anyone in house smoked WP with year.

Participants were also asked about whether they had close friends who smoked cigarettes; those who said “Some of them” were more likely to be smokers (WP or cigarette) than who said “None of them” (OR=5.11; 95% CI 3.71, 7.05), while those who said “Most or all of them” were considerably more likely to be smokers (WP or cigarette) than who said “None of them” (OR=8.24; 95% CI 5.69, 11.9). Those who said “Don’t know” were more likely to be smokers (WP or cigarette) than who said “None of them” (OR=2.07; 95% CI 1.06, 4.06). The results in all instances were statistically significant ($p<0.0001$). There was no statistically significant interaction between close friends who smoked cigarettes with year or modality.

There was a statistically significant interaction with friends who smoked WP and modality ($p=0.004$). For example, those who said “Some of them” were considerably more likely to smoke WP than cigarettes (OR=7.90; 95% CI 5.31, 11.7). Those who

said “Most or all of them” were considerably more likely to smoke WP than cigarettes (OR=9.21; 95% CI 5.65, 15.0) while those who said “None of them” more likely to smoke WP than cigarettes (OR=4.57; 95% CI 3.45, 6.10). However, another observation in this area was that participants who said “Some of them” were more likely to be smokers (WP or cigarette) than who said “None of them” (OR=4.90; 95% CI 3.62, 6.64), while those who said “Most/all of them” were considerably more likely to be smokers (WP or cigarette) than who said “None of them” (OR=12.9; 95% CI 8.91, 18.8); this result was also statistically significant ($p < 0.0001$). There was no statistically significant interaction between close friends who smoked WP with year.

Table 50. Estimates of the effects of family and peer smoking as predictor of smoking by year and modality

Factor of interest (FOI)	Level	FOI Main effect			FOI*Year (2016 to 2015)			FOI*Modality (WP to cigarette)		
		OR	95% CI	p-value*	OR	95% CI	p-value*	OR	95% CI	p-value*
Family and peer smoking										
Parent smoke cigarettes	No	1.00	---		1.96	(1.41,2.73)		5.05	(3.67,6.93)	
	Yes	2.33	(1.73,3.13)	<.0001	2.80	(2.09,3.77)	0.01	6.77	(5.08,9.02)	0.03
	Don't know	0.57	(0.21,1.56)		31.9	(4.50,226.7)		2.18	(0.91,5.23)	
Parent smoke WP	No	1.00	---					3.56	(2.71,4.66)	
	Yes	4.32	(3.23,5.77)	<.0001	2.47	(1.99,3.07)	0.09	11.5	(8.10,16.3)	<.0001
	Don't know	1.36	(0.74,2.50)					6.01	(2.39,15.1)	
Anyone in house smoke cigarettes	No	1.00	---							
	Yes	3.26	(2.42,4.38)	<.0001	2.28	(1.85,2.82)	0.07	5.58	(4.50,6.93)	0.11
	Don't know	2.24	(1.12,4.46)							
Anyone in house smoke WP	No	1.00	---					3.35	(2.59,4.32)	
	Yes	6.02	(4.55,7.98)	<.0001	2.23	(1.80,2.77)	0.32	17.2	(11.7,25.2)	<.0001
	Don't know	1.51	(0.68,3.35)					1.00	(0.31,3.25)	
Close friend smoke cigarettes	None of them	1.00	---							
	Some of them	5.11	(3.71,7.05)	<.0001	2.12	(1.71,2.63)	0.98	5.77	(4.63,7.20)	0.06
	Most/All of them	8.24	(5.69,11.9)							
	Don't know	2.07	(1.06,4.06)							
Close friend smoke WP	None of them	1.00	---					4.57	(3.45,6.10)	
	Some of them	4.90	(3.62,6.64)	<.0001	1.89	(1.53,2.34)	0.09	7.90	(5.31,11.7)	0.004
	Most /All of them	12.9	(8.91,18.8)					9.21	(5.65,15.0)	
	Don't know	1.36	(0.60,3.07)					1.49	(0.43,5.14)	

Note. *Significant difference at $p \leq 0.05$ are denoted in bold font; non-significant difference at $p > 0.05$; result account for school cluster effect and ID. Participants surveyed in 2015 only: 257; in 2016 only: 219; in both years: 669.

6.3.2.4 Family attitude variables

Table 51 shows the estimated effects of family attitudes towards smoking as predictors of students smoking by year and modality. Those who said their parents got upset when they smoked cigarettes were less likely to be smokers (WP or cigarette) than those who said their parents did not get upset (OR=0.74; 95% CI 0.50, 1.11). This result that is statistically significant ($p=0.002$). There were no significant difference between agree and disagree. However, agree compared to don't know was significant (OR=0.56; 95% CI 0.40, 0.78). There was no statistically significant interaction between parents got upset when they smoked cigarettes with year or modality.

There was a statistically significant interaction with parental attitude when their kids smoked WP and modality ($p<0.0001$). Those whose parents got upset when they smoked WP were more likely to smoke WP than cigarettes (OR=4.18; 95% CI 2.94, 5.94) and those who said their parents would not be upset if they smoked WP were considerably more likely to smoke WP than cigarettes (OR=11.7; 95% CI 6.80, 20.2). Meanwhile, those who responded "Don't know" to this question were considerably more likely to smoke WP than cigarettes (OR=10.9; 95% CI 6.21, 19.1). Parental attitude when their kids smoked WP and year was also statistically significant ($p=0.03$). Students who said their parents would be upset if they smoked WP were more likely to smoke (WP or cigarette) in 2016 than 2015 (OR=2.49; 95% CI 1.71, 3.62), while those whose responded "Don't know" were more likely to smoke (WP or cigarette) in 2016 than 2015 (OR=4.01; 95% CI 2.12, 7.57). However, those who said their parents got upset when they smoked WP were less likely to smoke (WP or cigarettes) than they said their parents did not (OR=0.34; 95% CI 0.24, 0.48); this result was statistically significant ($p<0.0001$).

With regard to the effect of individual family attitudes as predictors of smoking by year and modality, it was found that those with parents who had rules about not smoking cigarettes were less likely to smoke (WP or cigarettes) than they said their parents did not (OR=0.51; 95% CI 0.37, 0.69), while those whose responded “Don’t know” were less likely to smoke (WP or cigarette) than they said their parents did not (OR=0.66; 95% CI 0.46, 0.96); this result was statistically significant ($p=0.0001$). There was no statistically significant interaction between parents who had rules about not smoking cigarettes with year or modality.

Another statistically significant interaction was between parents had rules about not smoking WP and modality ($p=0.0001$). Those who said their parents had rules about not smoking WP were more likely to smoke WP than cigarettes (OR=4.16; 95% CI 2.88, 6.00), while those who said “Don’t know” were more likely to smoke WP than cigarettes (OR=5.47; 95% CI 3.41, 8.77). Those who said their parents did not have rules about not smoking WP were considerably more likely to smoke WP than cigarettes (OR=11.5; 95% CI 7.30, 18.2). However, those who said their parents had rules about not smoking WP were less likely to smoke (WP or cigarettes) than they said their parents did not (OR=0.48; 95% CI 0.36, 0.65), while those whose responded “Don’t know” were less likely to smoke (WP or cigarette) than they said their parents did not (OR=0.64; 95% CI 0.45, 0.90); this result was statistically significant ($p=0.0001$). There was no statistically significant interaction between parents who had rules about not smoking WP with year.

There was a statistically significant interaction between parents were acceptable with kids under 16 smoking cigarettes and year ($p=0.02$). With regard to whether students believed their parents were OK with kids under 16 smoking cigarettes, those who responded “Agree” were more likely to smoke (WP or cigarette) in 2016 than 2015

(OR=4.00; 95% CI 1.81, 8.86); those who responded “Don’t know” were more likely to smoke (WP or cigarette) in 2016 than 2015 (OR=4.31; 95% CI 2.37, 7.82). Those who responded “Disagree” were more likely to smoke (WP or cigarette) in 2016 than 2015 (OR=1.95; 95% CI 1.38, 2.75). Furthermore, students who said their parents were OK with such cigarette smoking were more likely to smoke (WP or cigarette) than they said their parents did not (OR=1.79; 95% CI 1.17, 2.72), while those who responded “Don’t know” were more likely to smoke (WP or cigarette) than they said their parents did not (OR=1.71; 95% CI 1.22, 2.38); the result was statistically significant ($p=0.0006$). There was no statistically significant interaction between parents were OK with kids under 16 smoking cigarettes with modality.

There was also a statistically significant interaction with parents acceptable with kids under 16 smoking WP and modality ($p=0.01$). Those who agreed that their parents were OK with kids under 16 smoking WP were considerably more likely to smoke WP than cigarettes (OR=9.32; 95% CI 5.36, 16.2), while those who responded “Don’t know” were considerably more likely to smoke WP than cigarettes (OR=7.87; 95% CI 4.97, 12.5). Those who said their parents were not OK with such smoking were more likely to smoke WP than cigarettes (OR=4.55; 95% CI 3.54, 5.84). Parents OK with kids under 16 smoking WP and year was also statistically significant ($p=0.04$). Students who said their parents were OK with such smoking were more likely to smoke (WP or cigarette) in 2016 than 2015 (OR=3.25; 95% CI 1.70, 6.22); those who said “Don’t know” were more likely to smoke (WP or cigarette) in 2016 than 2015 (OR=3.96; 95% CI 2.35, 6.67), and those who said their parents were not acceptable with such smoking were more likely to smoke (WP or cigarette) in 2016 than 2015 (OR=1.99; 95% CI 1.54, 2.59). Furthermore, students who said their parents were OK with such WP smoking were more likely to smoke (WP or cigarette) than they said

their parents did not (OR=3.31; 95% CI 2.27, 4.83), while those who said “Don’t know” were more likely to smoke (WP or cigarette) than they said their parents did not (OR=1.88; 95% CI 1.37, 2.60); the results were statistically significant in all instances ($p<0.0001$).

Table 51. Estimates of the effects of family attitudes towards smoking as predictor of smoking by year and modality

Factor of interest (FOI) Family attitude variable	Level	FOI Main effect			FOI*Year (2016 to 2015)			FOI*Modality (WP to cigarette)		
		OR	95% CI	p-value*	OR	95% CI	p-value*	OR	95% CI	p-value*
Parents upset if child smokes cigarettes	Agree	0.74	(0.50,1.11)							
	Don't know	1.33	(0.83,2.15)	0.002	2.48	(1.78,3.45)	0.34	5.89	(4.26,8.14)	0.63
	Disagree	1.00	---							
Parents upset if child smokes WP	Agree	0.34	(0.24,0.48)		2.49	(1.71,3.62)		4.18	(2.94,5.94)	
	Don't know	0.72	(0.47,1.11)	<.0001	4.01	(2.12,7.57)	0.03	10.9	(6.21,19.1)	<.0001
	Disagree	1.00	---		1.34	(0.74,2.44)		11.7	(6.80,20.2)	
Parent have rules about not smoking cigarettes	Agree	0.51	(0.37,0.69)							
	Don't know	0.66	(0.46,0.96)	0.0001	2.52	(1.80,3.53)	0.06	6.00	(4.32,8.35)	0.29
	Disagree	1.00	---							
Parents have rules about not smoking WP	Agree	0.48	(0.36,0.65)					4.16	(2.88,6.00)	
	Don't know	0.64	(0.45,0.90)	<.0001	2.45	(1.78,3.35)	0.34	5.47	(3.41,8.77)	0.0001
	Disagree	1.00	---					11.5	(7.30,18.2)	
Parents OK for child under 16 to smoke cigarettes	Agree	1.79	(1.17,2.72)		4.00	(1.81,8.86)				
	Don't know	1.71	(1.22,2.38)	0.0006	4.31	(2.37,7.82)	0.02	5.94	(4.35,8.10)	0.66
	Disagree	1.00	---		1.95	(1.38,2.75)				
Parents OK for child under 16 to smoke WP	Agree	3.31	(2.27,4.83)		3.25	(1.70,6.22)		9.32	(5.36,16.2)	
	Don't know	1.88	(1.37,2.60)	<.0001	3.96	(2.35,6.67)	0.04	7.87	(4.97,12.5)	0.01
	Disagree	1.00	---		1.99	(1.54,2.59)		4.55	(3.54,5.84)	

Note. *Significant difference at $p \leq 0.05$ are denoted in bold font; non-significant difference at $p > 0.05$; result account for school cluster effect and ID. Participants surveyed in 2015 only: 257; in 2016 only: 219; in both years: 669.

6.3.2.5 Ruling on smoking in Islam

Table 52 shows that the effect of students' understanding of the ruling on smoking in Islam as a predictor of smoking by year and modality. Students who thought smoking was discouraged in Islam were more likely to smoke (WP or cigarette) than who believed smoking to be forbidden in Islam (OR=2.01; 95% CI 1.50, 2.67); students who thought smoking was desirable were more likely to smoke (WP or cigarette) than students who thought it was forbidden (OR=4.55; 95% CI 1.67, 12.4), whereas those who responded "Don't know" were more likely to smoke (WP or cigarette) than students who thought smoking was forbidden (OR=2.92; 95% CI 2.07, 4.11; this result was statistically significant ($p < 0.0001$)). There was no statistically significant interaction between understanding of the ruling on smoking in Islam with year or modality.

Table 52. Estimates of the effect of students' understanding of the ruling on smoking in Islam as predictor of smoking by year and modality

Factor of interest (FOI)	Level	FOI Main effect			FOI*Year (2016 to 2015)			FOI*Modality (WP to cigarette)		
		OR	95% CI	p-value*	OR	95% CI	p-value*	OR	95% CI	p-value*
Ruling on smoking in Islam	Forbidden	1.00	---							
	Discouraged	2.01	(1.50,2.67)	<.0001	2.26	(1.83,2.79)	0.29	5.65	(4.54,7.03)	0.40
	Desirable	4.55	(1.67,12.4)							
	Don't know	2.92	(2.07,4.11)							

Note. *Significant difference at $p \leq 0.05$ are denoted in bold font; non-significant difference at $p > 0.05$; result account for school cluster effect and ID. Participants surveyed in 2015 only: 257; in 2016 only: 219; in both years: 669.

6.3.2.6 Religiosity

The effects of religiosity factors as predictors of smoking by modality and year are shown in Table 53.

There is a statistically significant interaction between Experience & Orthopraxis and modality ($p=0.03$). Students who scored higher on the Experience & Orthopraxis factor were less likely to smoke WP (OR=0.78 per unit score; 95% CI 0.67, 0.90) and much less likely to smoke cigarettes (OR=0.64 per unit score; 95% CI 0.55, 0.75). However, students who scored higher on Experience & Orthopraxis were less likely to smoke (WP or cigarettes) (OR=0.71 per unit score; 95% CI 0.63, 0.80), and the result was statistically significant ($p<0.0001$). There was no statistically significant interaction between Experience & Orthopraxis with year.

Another statistically significant interaction was between Belief and modality ($p=0.04$). Students who scored highly on Belief were much less likely to smoke cigarettes (OR=0.79 per unit score; 95% CI 0.68, 0.91), while students who scored higher on the Belief were less likely to smoke WP but the Belief was not statistically significant for smoking WP (OR=0.94 per unit score; 95% CI 0.82, 1.09). However, students who scored higher on Belief were less likely to smoke (WP or cigarettes) (OR=0.86 per unit score; 95% CI 0.77, 0.97), and the result was statistically significant ($p=0.01$). There was no statistically significant interaction between Belief and year.

Those who scored highly on the Devotion & Practice were significantly associated with being less likely to smoke (WP or cigarettes) (OR=0.73 per unit score; 95% CI 0.69, 0.78); this result was statistically significant ($p<0.0001$). There was no statistically significant interaction between Devotion & Practice with year or modality.

Table 53. Estimates of the effect of religiosity as predictor of smoking by year and modality

Factor of interest (FOI)	FOI Main effect			FOI*Year (2016 to 2015)			FOI*Modality (WP to cigarette)		
	OR	95% CI	p-value*	OR	95% CI	p-value*	OR	95% CI	p-value*
Religiosity Factors									
Experience & Orthopraxis Factor score**	0.71	(0.63,0.80)	<.0001	2.41	(1.95,2.99)	0.41	See footnote †		0.03
Knowledge Factor score**	0.99	(0.93,1.05)	0.75	2.43	(1.97,3.00)	0.07	5.54	(4.47,6.86)	0.24
Belief Factor score**	0.86	(0.77,0.97)	0.01	2.44	(1.98,3.02)	0.39	See footnote ‡		0.04
Devotion & Practice Factor score**	0.73	(0.69,0.78)	<.0001	2.26	(1.83,2.79)	0.83	5.65	(4.53,7.03)	0.11

Note. *Significant difference at $p \leq 0.05$ are denoted in bold font; non-significant difference at $p > 0.05$; result account for school cluster effect and ID.

** Factor score ranges from 0 to 10.

†Modality-specific odds ratios and 95% confidence intervals: Cigarettes 0.64 (0.55, 0.75), WP 0.78 (0.67, 0.90).

‡ Modality-specific odds ratios and 95% confidence intervals: Cigarettes 0.79 (0.68, 0.91), WP 0.94 (0.82, 1.09).

Participants surveyed in 2015 only: 257; in 2016 only: 219; in both years: 669.

6.3.3 Multi-factor bivariate logistic regression analyses

Table 54 shows the multi-factor bivariate logistic regression model of variables that are statistically significantly associated with student smoking (defined as having ever smoked a cigarette or WP) by modality and year. Examining the main effects of year and modality and their interaction within the multi-factor bivariate model, only year was statistically significant ($p < 0.001$). It can be seen that the likelihood for follow-up 2016 smoking (WP or cigarette) was more likely than in the baseline 2015 (OR=1.69; 95% CI 1.26, 2.28).

There is a statistically significant interaction between sex and modality ($p = 0.01$), but the difference is not simple relationship between WP and cigarettes and sex, as demonstrated by the estimated 95% confidence intervals including 1.00. However, males were to be smokers (WP or cigarette) than females (OR=2.26; 95% CI 1.63, 3.14; $p < 0.001$). There was no statistically significant interaction between sex and year.

It was found a statistically significant interaction between total of wealth index per unit and modality ($p = 0.001$). Wealthy students were more likely to smoke WP, the more items on the wealth index they owned (OR=1.28; 95% CI 1.13, 1.45), but the wealth index was not statistically significant for smoking cigarettes (OR=0.98; 95% CI 0.86, 1.12). However, higher the wealth index, the greater the likelihood of smoking (WP or cigarette) (OR=1.12; 95% CI 1.01, 1.24); this result was statistically significant ($p = 0.03$). There was no statistically significant interaction between wealth index per unit and year.

Having a parent who smoked cigarettes made students more likely to be smokers (WP or cigarette) than students who said their parents did not (OR=1.62; 95% CI 1.20, 2.18); this result was statistically significant ($p = 0.007$). There was no statistically

significant interaction between parent smoking cigarettes with year. The results shows a statistically significant interaction between having a parent smoking WP and modality ($p=0.0001$), but the difference is not simple relationship between WP and cigarettes and parents smoking WP, as demonstrated by the estimated 95% confidence intervals including 1.00. However, having a parent who smoked WP made students more likely to be smokers (WP or cigarette) than students who said their parents did not (OR=2.37; 95% CI 1.75, 3.20); this result was statistically significant ($p<0.0001$). There was no statistically significant interaction between parents smoking WP with year.

Having a smoker of cigarettes in the house made students more likely to be smokers (WP or cigarette) than who said “No” (OR=1.54; 95% CI 1.11, 2.15); this result was statistically significant ($p=0.03$). There was no statistically significant interaction between anyone in the house smoking cigarettes with year or modality. There was also a statistically significant interaction with anyone in the house smoking WP and modality ($p<0.0001$). It was found that those who said “Yes” were considerably more likely to smoke WP than cigarettes (OR=9.65; 95% CI 3.63, 25.6). However, having a smoker of WP in the house made students more likely to be smokers (WP or cigarette) than who said “No” (OR=2.75; 95% CI 2.00, 3.79); this result was statistically significant ($p<0.0001$). There was no statistically significant interaction between anyone in the house smoking WP with year.

Students were more likely to be smokers (WP or cigarette) if they had friends who smoked (cigarettes or WP); this result was statistically significant where students had some cigarette-smoker friends (OR=2.29; 95% CI 1.59, 3.29) or where most/all of their friends were cigarette smokers (OR=3.36; 95% CI 2.17, 5.20); and where students had some friends who smoked WP (OR=1.94; 95% CI 1.38, 2.74) or where

most/all of their friends smoked WP (OR=3.06; 95% CI 1.97, 4.74). The result was statistically significant for both (WP and cigarettes) ($p < 0.0001$). There was no statistically significant interaction between friends who smoked (WP and cigarettes) with year or modality.

There was a statistically significant interaction between parents would get upset if their kids smoked WP and modality ($p = 0.004$), but the difference is not simple relationship between WP and cigarettes by parents being upset about WP, as was also found for parents smoking WP. Parents would get upset if their kids smoked WP and year was also statistically significant ($p = 0.02$). Students who agreed their parents would get upset were more likely to smoke (WP or cigarette) in 2016 than 2015 (OR=1.96; 95% CI 1.44, 2.65), while those who responded “Don’t know” were more likely to smoke (WP or cigarette) in 2016 than 2015 (OR=2.79; 95% CI 1.49, 5.23). However, those who thought their parents would be upset if they smoked WP were less likely to be smokers (WP or cigarette) than they said their parents did not (OR=0.64; 95% CI 0.44, 0.94) and the result was statistically significant ($p = 0.003$). Another statistically significant interaction was between parents had rules about not smoking WP and modality ($p = 0.01$); but the difference is not a simple relationship between WP and cigarettes by parents rules about WP, as was also found for parents smoking WP. There was no statistically significant interaction between parents had rules about not smoking WP with year. Students who agreed that their parents were OK with such WP smoking were more likely to smoke (WP or cigarette) than they said their parents did not (OR=2.01; 95% CI 1.33, 3.04); the results were statistically significant in all instances ($p = 0.004$). There was no statistically significant interaction between parents were OK with such WP smoking with year or modality.

Those who scored highly on the Devotion & Practice were significantly associated with being less likely to smoke (WP or cigarettes) (OR=0.78 per unit score; 95% CI 0.73, 0.84); this result was statistically significant ($p<0.0001$). There was no statistically significant interaction between Devotion & Practice with year or modality. Students who thought smoking was discouraged in Islam were more likely to smoke (WP or cigarette) than who believed smoking to be forbidden in Islam (OR=1.58; 95% CI 1.16, 2.15), but the Desirable was not statistically significant for smoking (WP or cigarette) (OR=3.16; 95% CI 0.99, 10.1). Those who responded “Don’t know” were more likely to smoke (WP or cigarette) than students who thought smoking was forbidden (OR=1.50; 95% CI 1.03, 2.18) than students who thought smoking was forbidden); this result was statistically significant ($p=0.008$). There was no statistically significant interaction between understanding of the ruling on smoking in Islam with year or modality.

Table 54. Multi-factor bivariate regression model of all variables significant associated with student smoking by modality and year

Factor of interest (FOI)	Level	FOI Main effect			FOI*Year (2016 to 2015)			FOI*Modality (WP to cigarette)		
		OR	95% CI	p-value*	OR	95% CI	p-value*	OR	95% CI	p-value*
Sex	Male	2.26	(1.62,3.14)	<.0001	---	---	---	1.29	(0.42,3.98)	0.01
	Female	1.00	---					2.28	(0.71,7.30)	
Total wealth index**	Per unit	1.12	(1.01,1.24)	0.03	---	---	---	See footnote †		0.001
Parents smoke cigarettes	No	1.00	---							
	Yes	1.62	(1.20,2.18)	0.007	---	---	---	---	---	---
	Don't know	1.20	(0.53,2.70)							
Parents smoke WP	No	1.00	---					0.79	(0.25,2.45)	
	Yes	2.37	(1.75,3.20)	<.0001	---	---	---	2.05	(0.64,6.60)	0.0001
	Don't know	1.02	(0.46,2.25)					3.12	(0.66,14.7)	
Anyone in house smokes cigarettes	No	1.00	---							
	Yes	1.54	(1.11,2.15)	0.03	---	---	---	---	---	---
	Don't know	1.55	(0.58,4.19)							
Anyone in house smokes WP	No	1.00	---					2.12	(0.83,5.40)	
	Yes	2.75	(2.00,3.79)	<.0001	---	---	---	9.65	(3.63,25.6)	<.0001
	Don't know	1.58	(0.36,6.93)					0.25	(0.02,2.54)	
Close friend smokes cigarettes	None of them	1.00	---							
	Some of them	2.29	(1.59,3.29)	<.0001	---	---	---	---	---	---
	Most /all of them	3.36	(2.17,5.20)							
	Don't know	2.34	(0.85,6.49)							
Close friend smokes WP	None of them	1.00	---							
	Some of them	1.94	(1.38,2.74)	<.0001	---	---	---	---	---	---
	Most /all of them	3.06	(1.97,4.74)							
	Don't know	0.21	(0.03,1.42)							

Note. *Significant difference at $p \leq 0.05$ are denoted in bold font; non-significant difference at $p > 0.05$; result account for ID effect.

**Number of items ranges from 0 to 8.

†Modality-specific odds ratios and 95% confidence intervals: Cigarettes 0.98 (0.86, 1.12), WP 1.28 (1.13, 1.45).

Participants surveyed in 2015 only: 257; in 2016 only: 219; in both years: 669.

Table 54. Cont.

Factor of interest (FOI)	Level	FOI Main effect			FOI*Year (2016 to 2015)			FOI*Modality (WP to cigarette)		
		OR	95% CI	p-value*	OR	95% CI	p-value*	OR	95% CI	p-value*
Parents upset if child smokes WP	Agree	0.64	(0.44,0.94)	0.003	1.96	(1.44,2.65)	0.02	1.01	(0.32,3.12)	0.004
	Don't know	1.22	(0.75,1.96)		2.79	(1.49,5.23)		2.93	(0.86,9.95)	
	Disagree	1.00	---		0.89	(0.50,1.60)		1.70	(0.50,5.80)	
Parents have rules about not smoking WP	Agree	0.76	(0.54,1.07)	0.09	---	---	---	1.44	(0.46,4.57)	0.01
	Don't know	0.65	(0.43,0.97)		---	---		1.18	(0.36,3.89)	
	Disagree	1.00	---		---	---		2.94	(0.90,9.64)	
Parents OK for child under 16 to smoke WP	Agree	2.01	(1.33,3.04)	0.004	---	---	---	---	---	---
	Don't know	1.20	(0.82,1.76)		---	---		---	---	
	Disagree	1.00	---		---	---		---	---	
Devotion & Practice Factor score**	Per unit	0.78	(0.73,0.84)	<.0001	---	---	---	---	---	---
Ruling on smoking in Islam	Forbidden	1.00	---	0.008	---	---	---	---	---	---
	Discouraged	1.58	(1.16,2.15)		---	---		---	---	
	Desirable	3.16	(0.99,10.1)		---	---		---	---	
	Don't know	1.50	(1.03,2.18)		---	---		---	---	

Note. *Significant difference at $p \leq 0.05$ are denoted in bold font; non-significant difference at $p > 0.05$; results account for ID effect.

** Factor score ranges from 0 to 10.

Participants surveyed in 2015 only: 257; in 2016 only: 219; in both years: 669.

6.4 Discussion

The study reported here was a pilot repeated cross-sectional survey among Muslim primary school children in Jordan. This is the first study to examine the association between religiosity and prevalence of smoking cigarettes and WP using a modified multidimensional religiosity scale for Muslim school children in Islamic societies. This chapter focuses on the follow-up resurvey conducted a year after the initial survey to estimate the change in forms of tobacco use from 2015 to 2016 and also examines the association between religiosity and prevalence of smoking cigarettes and WP.

The need for a follow-up study such as this has been justified by other scholars (Karma McKelvey et al., 2013; Mzayek et al., 2012), who have demonstrated the importance of observing patterns by adopting a follow-up period. These studies found that prevalence of WP and cigarette smoking tends to increase dramatically over the follow-up period, and shows similar patterns in boys and girls.

The study by Sweis & Chaloupka (2014) followed up after a longer period than the current one, which had a follow-up only over 1 year. Sociodemographic characteristics which do not change much over one year may change over a longer time frame changes to be observed. It should be noted that where changes have not occurred in this study such results are still significant as they show the stability of the questionnaire and hence contribute to aspects of validity and reliability.

Among the demographic variables that showed very small changes were ownership of a cell phone and having internet at home among participants. In terms of explanations for these changes it must be noted that having such items as cell phones and the internet is expected to increase each year due to the increasing ubiquity of mobile and electronic devices. Having more social activities or peers has been linked to increased likelihood to smoke (Huang et al., 2014), and ownership of cell phones and having internet access

(specifically to social media) are likely to increase social activity. Ownership of such items as a housing and having a maid and dining table, by contrast, are more dependent on the country's economy and net income of workers.

In terms of the effect of wealth index items as predictors of smoking by year and modality, it was noted that the number of items had a significant effect on likelihood to smoke (WP or cigarettes), and the more wealthy the student the more likely they were to smoke WP. Although this contradicts research by (Toukan, 2016), other studies have also found that the wealthier people are more likely to smoke. For example, one study in Jordan found that cigarette smoking significantly increased with increasing household wealth: percentages were 9% among the poorest and 18% among the richest in 2007; 6.3% and 13.8%, respectively, in 2009; and 10.9% and 15.5%, respectively, in 2012 (Jawad, Abdulrahim, & Daouk, 2016). In the same study it was found that WP smoking significantly increased richest as household wealth increased: percentages were 3% among the poorest and 12% among in 2007; 2% and 12%, respectively, in 2009; and 6% and 18%, respectively, in 2012 (Jawad et al., 2016). Kawafha (2014) also hypothesised that wealthier families tend to be more likely to smoke because of exposure to attractive tobacco advertising and the fact that tobacco is too expensive to be easily bought by poor families' children.

Another significant finding of this study at single-factor model is that smoking prevalence increases with age in 2015. In this study students aged 12 (OR=2.06; 95% CI 1.32, 3.20) and 13 (OR=2.48; 95% CI 1.14, 5.36) were more likely to smoke (WP or cigarettes) as students aged 10. Similarly, a recent study of school students in Irbid, Jordan, reported a lower prevalence of current smoking in lower grades (Karma McKelvey et al., 2013). Another study of Jordanian youth also concluded that youth are more likely to report "current WP smoking" as they get older and found that with every year increase in age, the odds of being a 30-day WP smoker significantly increased by 1.6 times (Alzyoud et

al., 2013). Another study concluded that the most common age at which adolescents initiated smoking, especially cigarettes, was 11–12 years old (Al-Sheyab et al., 2014). Concerningly, the Global School Based Student Health Survey found that the prevalence of smoking among youth aged 13–15 years in Jordan has risen over time, from 18% in 2000 to 19.9% in 2004 and 24.9% in 2009 (Sweis & Chaloupka, 2014).

The results of this study show that the prevalence of smoking among males was twice that of female smokers, and males smoked more WP than cigarettes at both at baseline and follow-up. This finding is consistent with the results of a previous study in Jordan (Karma McKelvey et al., 2013) and with literature showing that in Muslim societies more males smoke than females (Mandil, Hussein, Omer, Turki, & Gaber, 2007). For example, among university students it was found that smoking prevalence was 56% among males while that among females was only 11% (Khader & Alsadi, 2008). The fact that more males smoke more WP than females is also consistent with values in Muslim countries; men are more likely to be found at social gatherings than women and WP smoking is a more social form of smoking than cigarette smoking. Another study found that sex roles and the conservative nature of Jordanian families means that while boys are allowed out with friends, girls mostly stay at home (Jaber, Mzayek, Madhivanan, Khader, & Maziak, 2016). Other scholars attribute this pattern is due to more freedom of experimentation among boys and the inherent cognitive susceptibility of girls (Kheirallah et al., 2015). This is one reason why Jaber et al. (2016) found that a predictor of smoking among boys is their peers while a predictor of smoking among girls is their family. This finding has implications for rethinking emphasis in health promotion by giving due consideration to sex issues in Muslim countries (i.e. social settings for boys and the home for girls).

This study also found at single-factor models, that females smoked more WP than cigarettes and these results were stable across the 2 years of the study, with no significant changes or fluctuations. Females were more likely to be WP smokers than cigarettes

(OR=9.64; 95% CI 6.60, 14.1) in comparison with boys (OR=4.04; 95% CI 2.95, 5.53), even though males smoke more than females overall (WP or cigarettes). This result is consistent with the finding of another study that females constituted only 8.9% of cigarette smokers but 26.2% WP smokers (Mandil et al., 2007). It is also consistent with the findings of other studies based in Jordan (Alomari & Al-sheyab, 2017; Alzyoud et al., 2013). The literature shows that females tend to feel more encouraged to smoke WP than cigarettes because of its social acceptability and its positive sensory characteristics, such as an attractive smell and taste (Maziak, Eissenberg, et al., 2004; Maziak, Hammal, et al., 2004). Another study indicated that age, sex, and the belief that smoking leads to having more friends tend to be predictors of WP smoking among youth (Alzyoud et al., 2013).

Changes in the view that smoking is forbidden (*haram*) or not in Islam are important in this study because they may be a reflection of different messages issued by official committees concerning smoking. For example in 2006, the national Iftaa' Committee for Islamic Affairs in Jordan ruled that smoking was *haram* (Alzyoud et al., 2015; Jordan General Iftaa' Department, 2006). Media reactions to such messages may influence changes; however during this study it is not known whether such messages were issued. The changes seen may also reflect changes to rules in schools about smoking. The importance of such messages was also noted in an equivalent Christian sample, where religion played a major role in smoking rates in Brazilian university students (Gomes et al., 2013), where Christian religion has an impact on day to day living.

Students' views of smoking as being *haram* were not expected to change much over just 1 year because *haram* is a very strong aspect of Islam. However, the belief that smoking is something that is discouraged (*makruh*) is less serious than *haram* and this may be susceptible to change over a short period of time (e.g., 1 or 2 years). The option of "Don't know" may have been chosen by those who were less religious because it was expected that those who were religious would know the answer. It has indeed been claimed that,

unlike alcohol consumption, smoking is not forbidden in Islam (Alzyoud et al., 2015). In Jordan jurists have tended to be of the view that tobacco smoking is an acceptable sociable activity that is *makruh* but not *haram* (Ghouri et al., 2006).

Another key contributor to this trend is the sending of mixed messages about whether tobacco smoking is *haram* or merely disapproved of. Scholars such as Tahlil, Coveney, Woodman and Ward (2013) have argued that there are conflicting opinions among religious authorities on this issue. One study showed that Indonesian Muslims believe that there is no clear and direct statement in the Qur'an or Prophet Mohammad's (PBUH) teachings that indicate the prohibition of tobacco smoking.

This finding came from a study that investigated price elasticity of cigarette demand in Jordan and showed that a 10% increase in price would reduce smoking prevalence in Jordan by 3.7%, and at the same time reduce the overall tobacco smoking by 6% (Sweis & Chaloupka, 2014).

In terms of trends, another important issue to note was the significant drop in the resurveyed group in the number of students who indicated that their parents smoked. However, the patterns do not match with the figures for parents being upset when their children smoke cigarettes, which did not significantly change over the year. The importance of parental attitudes and messages to children has been indicated by another study where it was found that even just discussing the dangers of smoking with family members has a protective effect among youth (Jaber et al., 2016). However, the current study did not gauge any changes in parental messages over one year.

Indeed it has been argued that WP smoking has become a socially acceptable practice among the study population (Alzyoud et al., 2013). This acceptability is derived from the fact that WP smoking brings families into frequent contact. Smoking in the family promotes smoking habits in students as they reported being offered to smoke WP by

friends and family members. The findings of this study are consistent with previous studies where adolescents used WP at home or at social gatherings among friends or family members (Alzyoud et al., 2013; Azab et al., 2010; Shadid & Hossain, 2013).

Another contribution to this finding is family members' belief that WP smoking is less harmful than cigarettes (Abughosh, Yang, et al., 2012; Smith-Simone, Maziak, Ward, & Eissenberg, 2008). Indeed another Jordanian study found that an independent predictor of cigarette smoking progression among youth aside from friends' smoking was siblings' smoking (Jaber et al., 2016). The above findings therefore imply that Jordanian health promotion messages about cessation of WP smoking should target parents and family members.

In terms of estimates of the effect of religiosity as a predictor of smoking by year and modality, it was seen that the more religious students were less likely to smoke (WP or cigarettes). Indeed on this note it has been found in both Christian and in Muslim participants that religion has an important role in smoking behaviour (Gomes et al., 2013; Islam & Johnson, 2003).

In this study, it was shown that the more religious one is the less likely one is to smoke any type of tobacco (although WP is still more acceptable than cigarettes among such students). The model also shows that Experience & Orthopraxis, and Devotion & Practice are strong predictors of students being less likely to smoke (WP or cigarettes). This is consistent with literature indicating lower levels of cigarette smoking (OR=0.24; 95% CI 0.15, 0.40) and WP smoking (OR=0.27; 95% CI 0.17, 0.43) among students showing greater religious commitment (Alzyoud et al., 2015).

The full multi-factor model seems to fit the results of this study and literature's findings in many ways. Firstly, the model showed that Devotion & Practice has a strong influence on likelihood of smoking (WP or cigarettes) (OR=0.78; 95% CI 0.73, 0.84; $p<0.0001$)

and this is consistent with literature indicating that these two are linked to students being more religious and less likely to smoke (Alzyoud et al., 2015). Devotion & Practice is also linked to both the cognitive and the practical aspect of religiosity and is therefore likely to have a strong effect on practising what the Qur'an says. Secondly, the model also shows that as the number of friend's increases, the likelihood of smoking also increases. Parental attitudes to WP smoking, especially relating to rules about not smoking and getting upset if their children smoke, are shown in the model as having a significant effect on not smoking, and this is consistent with the evidence in the literature. Thirdly, the model suggests the influences of parental smoking of WP and anyone in the house smoking WP are stronger than the influences of those groups smoking cigarettes.

In terms of limitations, this study did not consider dual smokers of WP and cigarettes and also those who switched from one form of smoking to the other over the study period. It would have been useful for this data to be captured to find out if smoking one form is a precedent for smoking the other. For example, scholars have cited the fact that being a former WP smoker is a predictor of initiating cigarette smoking (Karma McKelvey et al., 2014). This study also had the limitations of a short follow-up period of just 1 year. More trends could have been apparent over a longer period. The findings are however very useful in demonstrating stability and constancy in the way questions were answered, which contributes to the overall validity and reliability of the questionnaire.

Chapter 7 : Discussion

7.1 Introduction

This chapter will focus on discussion of the major findings of final multiple logistic regression models at 2015 and at 12 month follow-up in 2016, as well the novel religiosity scale developed in this study for Muslim youth in Jordan. Findings that are more specific have been discussed in Chapters 4, 5 and 6. The significant findings discussed here are those related to the question: *What is the relationship between religiosity and prevalence of cigarette and WP smoking in Muslim school children in Jordan?*

This chapter begins with the association between religiosity factors and smoking, followed by other contextual issues regarding the association of smoking with religiosity. The second part of the chapter discusses the health promotion implications, and then presents the recommendations, significance, limitations, and strengths of this study, along with directions for further research and an overall conclusion.

Before proceeding, it is important to recap the hypotheses related to the association between religiosity and smoking, which were confirmed in the current study. As recapped in Table 55 we have 8 hypotheses (4 religiosity factors and 2 smoking modalities).

Table 55. Recapping study hypotheses

An increase in	Will be associated with	of
1. Strength of religious Belief	Lower prevalence	i. Cigarette smoking
2. Strength of religious Devotion & Practise		
3. Strength of religious Knowledge		ii. WP smoking
4. Strength of religious Orthopraxis & Experience		

This study confirms the following hypotheses:

1. Strength of religious Devotion & Practice is associated with lower prevalence of cigarette smoking.
2. Strength of religious Devotion & Practice is associated with lower prevalence of WP smoking.

There was no evidence to confirm the other six hypotheses, however there was an indication that Belief could be associated with a higher prevalence of WP smoking in the 2015 baseline analysis.

7.2 Association between religiosity factors and smoking

Among the four religiosity factors developed in Chapter 4 ('Experience & Orthopraxis', 'Knowledge', 'Belief', and 'Devotion & Practice'), 'Devotion & Practice' had the strongest association with the likelihood of not smoking. This factor of religiosity was significantly associated with smoking status in the final multiple variable model including religiosity for 2015 baseline in Chapter 5 and significantly associated with smoking (WP or cigarettes) and in the final multi-factor bivariate repeated measures model in Chapter 6. This is consistent with local literature indicating that being more religious means being less likely to smoke (Alzyoud et al., 2015). Devotion & Practice is also linked to both the cognitive and the practical aspect of religiosity, and is therefore likely to have a strong effect on practising what the Qur'an says. This factor of religiosity was therefore used to confirm Hypothesis 1 (H1).

As illustrated in Table 36, Devotion & Practice was associated with less smoking of cigarettes and less smoking of WP at 2015 baseline. Similarly, Table 54 meanwhile shows that Devotion & Practice was associated with less smoking tobacco (WP or cigarettes) over the two years (baseline and 12 month follow-up) and the result was statistically significant– a result consistent with the results of the 2015 baseline study. Devotion & Practice, as an aspect of religion, is an inner call, which the individual does voluntarily. This could be due to the influence that Islamic lessons, mosques and Qur'an memorisation centres play in the life of a Muslim child. For example, during an Islamic lesson in the school, a religious instructor might emphasise the importance of praying 5 times a day in congregation and at the right time. Hence, such intrinsic knowledge contributes to intrinsic motivation not to smoke. Other studies have alluded to the importance of intrinsic motivation in smoking cessation efforts (Alzyoud et al., 2015).

Another finding related to the significant association of students' understanding of the ruling on smoking in Islam with smoking prevalence. The responses of 'forbidden' or

'discouraged' were associated with lower prevalence of smoking (cigarettes and WP) compared to responses of 'desirable' or 'don't know'. This uncovered fact was not among the original hypotheses. Given that all religiosity-based questions had some effect on either smoking cigarette or smoking WP, it therefore added to the conclusion that there is an association between religiosity and smoking.

The final multiple bivariate model across the two years in Chapter 6 showed that the associations were statistically significant, with students who thought the ruling on smoking was Forbidden according to Islam were less likely to smoke overall (WP or cigarettes) than were students who thought it was Discouraged, Desirable or Do not know. These results are consistent with the final multiple variable model including religiosity for the 2015 baseline results in Chapter 5, which showed that understanding of the ruling on smoking in Islam was significantly associated with cigarettes smoking in children. Students who thought the ruling on smoking was Forbidden according to Islam were less likely to smoke cigarettes than were students who thought it was Discouraged, Desirable or Do not know.

This finding suggests that publicising that smoking tobacco is *haram* can be an effective strategy for controlling cigarette smoking among Muslim youth. As stated in previous chapters, new *fatwas* and consistent messages may need to be introduced to enforce the message that smoking tobacco is *haram*. Students' views of smoking as being *haram* were not expected to decrease the percentage of smoking over only one year because *haram* is a very strong aspect of Islam, but the influence of mixed messages from official sources could be contributing to high smoking prevalence (Alzyoud et al., 2015; Jordan General Iftaa' Department, 2006). The importance of such messages is not unique to Muslim youth, a similar effect was also observed in Brazil where Christianity plays an important cultural role, impacting on smoking rates in Brazilian university students (Gomes et al., 2013).

The final model including religiosity at 2015 baseline, in Chapter 5, also showed that the Belief factor had a significant association with increased WP smoking at 2015 baseline. However, it was not present in the final multi-factor bivariate model at across the two years in Chapter 6. This factor was statistically significant at the simple model stage (without other factors) at 2015 baseline and was associated with less likelihood to smoke cigarettes. It was also present in the bivariate model (without other factors) at one year follow-up in 2016, with students with high scores were less likely to smoke (WP or cigarettes) and less likely to smoke cigarettes.

Overall the investigator therefore tends to reject the null hypothesis that "increase in the Belief factor is not be associated with less smoking". There is however the conflicting result for the baseline final model where increased Belief was associated with increased WP smoking.

The new religiosity factors that have been developed in the current pilot study are of special significance in health promotion. For example, religion can be used as a tool to shape beliefs of Muslim students about WP or cigarette smoking. Studies have shown that children are usually offered WP by friends and family members. This could be attributed to family members' mistaken belief that WP smoking is less harmful than cigarettes (Alzyoud et al., 2013). Religion can be of use in sending clear messages to students of the harmful effects of smoking in religious terms and justified declarations. Although there is no strong evidence that WP smoking is a gateway for initiating cigarette smoking (Veeranki, Alzyoud, Kheirallah, et al., 2015), religious messages targeting tobacco smoking could be reoriented to target WP through *fatwas*. This study further argues that such strategies could be regarded as bottom-up public health strategies as it has been found that susceptibility to smoking, defined as the lack of a firm decision against smoking, is a strong predictor of regular smoking and addiction. In this regard it has been argued that the social acceptability of WP has led to more youth having their

first experience with tobacco through WP smoking (Kheirallah et al., 2015). Religion can be a way of deterring that acceptability; one way of achieving this is by understanding the religiosity of the actual people who are affected, which this research has contributed to.

The scale of religiosity developed in this study may be of use to researchers and public health officers who are interested in finding the link between religiosity and smoking or other risky behaviours among young people. This study is therefore timely as it comes at a time when WP smoking in Jordan has become an epidemic among youth.

7.3 Other contextual issues of the association of smoking with religiosity

Key variables related to the association between smoking and religiosity were sex, wealth index, family and friends smoking, and family attitudes towards smoking. The findings of this study point to which groups are most at risk.

The final multi-factor bivariate model showed that males were more likely to be smokers than females and the results were statistically significant at across the two years. The difference by modality was statistically significant, however, the comparisons between WP and cigarette by sex as evidenced by the 95% confidence intervals both containing 1 demonstrates a more complex interaction between sex and modality of smoking (see Table 54). Although sex did not appear as significant at the 2015 baseline study, the follow-up study confirmed this outcome of males being more at risk than females. These results were consistent with those of other studies (Al-Ghaneem & Al-Nefisah, 2016; Khabour et al., 2012). They were also consistent with longitudinal studies and review studies in Jordan and countries other than Muslim ones (Islam & Johnson, 2003; Mandil et al., 2010; Karma McKelvey et al., 2013). The fact that more males smoke (WP or cigarettes) than females is also consistent with values in Muslim countries, where men are more likely to be found in social gatherings outside home that encourage smoking as compared to women. In addition, WP smoking is much more of a social activity than cigarette smoking (Jaber et al., 2016).

This research identified that a high score on the wealth index was a contributing factor to the likelihood to smoke. The findings should however be taken with caution because in the 2015 baseline study only one item (having internet at home) of a total of 7 appeared to be significantly associated with WP smoking only, (see Table 36). However, in the follow-up study, the total wealth index per unit was significantly associated with smoking

overall (WP or cigarettes). Wealthy students were more likely to smoke WP as compared with less wealthy students, (see Table 54).

This is consistent with previous work. For example, a study in Jordan found that cigarette and WP smoking significantly increased with increasing household wealth (Jawad et al., 2016). Nonetheless, the wealth index has produced mixed results in other studies outside of Jordan (Clare, Bradford, Courtney, Martire, & Mattick, 2014; Siahpush, Borland, & Yong, 2007) and therefore more research is needed to specifically investigate this association. Although the results are not conclusive, it is important to note that the total wealth index per unit was more associated with the likelihood to smoke WP than cigarette smoking, (see Table 36 and Table 54).

Another significant contribution of this study is that it identified a number of family and social variables that contribute to the smoking of either cigarettes or WP. In Chapter 6, parental smoking of cigarettes across the two years was statistically associated with likelihood of student smoking overall. The results also showed significant associations across the two years between students who had a parent smoking WP and likelihood to smoke overall as well as the interaction with modality, however it was a more complex interaction than the comparison between WP and cigarette across the responses for parents smoking WP (see Table 36 and Table 54). This demonstrates that there are some complex crossover effects from parent's WP smoking behaviour to youth cigarette or WP smoking. This could be because WP is more of a family or social group activity than cigarette smoking, which is more often a solo activity. This finding is important as it identifies that solo activities may need more health promotion strategies that are targeted to the individual, while group ones may need externally focused health promotion strategies and peer-led interventions. Internal or individually-focused health promotion strategies may include informing students about the health risks of smoking or

empowering individuals to resist group influences. External strategies may focus on messages sent to families.

These findings are consistent with a meta-analysis of 58 studies outside Jordan or Arab nations which found that contact with other smokers, particularly in the family, is a strong determinant of risk of smoking uptake (Leonardi-Bee, Jere, & Britton, 2011). The results of this study also are consistent with the evidence from a study among 17 Arab countries (Veeranki, Alzyoud, Dierking, et al., 2015) and from Jordan that children who have parents who smoke are associated more strongly with WP than cigarettes (Mzayek et al., 2011).

Students who had close friends smoking WP and cigarettes were more likely to smoke at 2015 baseline and at across the two years. For example, it was noted across the two years that students who have close friends smoking WP or cigarettes were more likely to smoke overall (WP and cigarettes). This was consistent with the 2015 baseline finding that students who have friends smoking cigarettes were more likely to smoke cigarettes and more likely to smoke WP. In addition, students with friends who smoking WP were more likely to smoke WP, (see Table 36). The findings of this study are consistent with previous studies where adolescents were more likely to smoke cigarettes and WP if they had friends who smoked cigarettes and WP (Mzayek et al., 2011). Other studies have also found that having current close friends smoking is strongly associated with an individual's smoking. However, such studies have gone a step further to investigate and clarify that the impact of a smoker as a close friend is greater than that of a smoking parent or sibling (Saari, Kentala, & Mattila, 2014). The findings of this study are consistent with previous studies where adolescents used WP at home or at social gatherings among friends or family members (Alzyoud et al., 2013; Azab et al., 2010; Shadid & Hossain, 2013).

Other significant social factors identified included having anyone in the house who smokes WP. At 2015 baseline such students were more likely to smoke WP, (see Table 36), and across the two years for overall smoking, those students were considerably more likely to smoke WP than cigarettes at follow-up (see Table 54). Students who had anyone in the house smoking cigarettes were more likely to smoke overall at follow-up only. This further confirms the need to look at individual activities versus group activities with respect to health communications, as has been shown by other scholars (Adachi-Mejia, Carlos, Berke, Tanski, & Sargent, 2012).

Parental rules and attitudes influenced WP smoking in students more than cigarette smoking. For example, at 2015 baseline, Table 36 shows that students who agreed that their parents would be upset if their child smoked WP were less likely to smoke WP ; as were those whose parents have rules about not smoking WP. Those whose parents believed it was acceptable if children under 16 smoked WP were more likely to smoke WP. However, students who agreed that their parents would be upset if their child smoked cigarettes were more likely to smoke WP.

In addition, the results across the two years were consistent with the 2015 baseline results. Students who said their parents would be upset if their child smoked WP were less likely to smoke overall (WP or cigarettes); the difference was also significant by year and by modality. Examining the interaction by year, students whose parents were upset if their child smokes WP were more likely to smoke overall in 2016 in comparison to 2015, whereas students who didn't know their parents attitudes to WP smoking were more likely to smoke overall in 2016 in comparison to 2015. The interaction with modality is more complex as evidenced by the 95% confidence intervals comparing WP to cigarette for all containing 1, which indicates some crossover of the attitudes in regards to WP to the uptake of both WP and cigarette smoking. Students whose parents having rules about smoking WP did not demonstrate statistically significant results with regards to smoking

overall, however there was a significant modality interaction. Similar to the modality interaction there was a complex association between parental attitudes to WP and children's WP or cigarette smoking. Those whose parents believed it was acceptable if their children under 16 smoked WP were more likely to smoke overall.

The importance of parental attitudes and messages to children has been indicated in other studies, where it was found that even just discussing the dangers of smoking with family members has a protective effect among youth (Jaber et al., 2016). However, this study did not gauge any changes in parental messages over 1 year. Overall, the findings suggest that parental rules and attitudes are more effective for WP smoking than they are for cigarette smoking. However there is evidence of some complex interplay between parental attitudes to WP or cigarettes and the children's smoking modality. There are implications therefore that can be drawn, mainly in terms of encouraging such attitudes from parents or making parents aware of the impacts of such attitudes.

7.4 Theoretical explanations of behaviour and the study findings

The results of this study indicate that religion can be a protective factor in child smoking behaviour because of the strong association between smoking and the Devotion & Practice factor and because of its pervasiveness in all aspects of a Muslim child's life. As discussed earlier, the only relevance of Bronfenbrenner's ecological theory in this study is that this theory concurs that religion fits among other influences. However the weakness in the application of this theory is that religion is portrayed as sitting outside the circle of influences, following after family and peer influences. This therefore indicates that religion has weaker influences in Western countries as it considered to be in the outer ring, called the macrosystem. This theory was developed in Western countries and may have primary applicability in these countries. However, in Muslim countries, religious influences may be seen as being in the middle of the ring together with other influences in the microsystem and hence strong.

The results also indicate that the parents and friends have influence on the conduct of smoking in youth children. SCT is relevant because it acknowledges the impact of other influences in the circle of influences, for example, family, parents and friends.

Addressing smoking with religion, family and friends has to be part of the intervention, as these elements cannot be separated. Thus, none of these factors exists in isolation and, in order to have an impact, they need to be considered as a set. For example, the ecological model considers the wider area of influence whereas the SCT model deals mainly with the elements closer to the child. In a Muslim country, religion is embedded in family and social life of a child. Therefore, any intervention will need to incorporate all elements of the child's environment.

This study has shown that when children practice religion they also learn by copying from parents or from people around the child. This learning fits within the social cognitive theory and social learning theory. Ecological theory emphasises that the environment, which includes religion, parents, friends and siblings, have a socialisation influence that affects the child. It can be seen that none of these theories can explain smoking behaviour in isolation but all of them contribute some elements to explain the whole phenomenon of smoking.

7.5 Limitations and strengths of the study

The current study has several strengths. An important strength in terms of consistency was the use of a follow-up survey using the same questions. This is the first study to examine the association between religiosity and tobacco use using a multidimensional scale of religiosity, which was developed and used among Muslim children in Islamic countries. In order to come up with a reliable measure, we avoided the unidimensional approach of previous studies, which has hindered the ability to detect any independence between factors or to detect which factors of religion are related. The religiosity measurement tool for Muslim children was tested in 2015 and further validated in 2016. Using a measure developed for a specific population (youth) and a specific religion (Islam) also consisted in a strength of this study; the religiosity scale was found to be both reliable and valid.

Statistically, the joint modelling of WP and cigarette smoking indicators over the two years surveyed enabled comparison of the effects of factors of interest across smoking modalities and years, but also improved the efficiency of the analyses by exploiting the covariance of the data. The approach taken has produced significant results where univariate modelling may not have.

Lastly, another important strength of this study is the general completeness of the data, avoiding the pitfalls of bias due to nonresponse.

Despite the above-mentioned strengths, the study also has limitations. Its major limitation is that the results were self-reported. Students may have answered the questions in accordance with what they thought is the norm or what they thought they were supposed to say. For a survey on this scale, self-reporting was however unavoidable. There is also the limitation of investigating the associations without using objective measures that are physiological or psychophysiological in nature.

The narrow focus of the study, on one governorate in Jordan, limits generalisability somewhat; this specificity was due to the limited budget of the study and the nature of PhD research. Other provinces would need to be investigated in a nationwide study.

Despite efforts to further adjust associations for sex, age, daily pocket money, father and mother education, wealth index, family and peer smoking and family attitude, it is also possible that factors other than the covariates included in our models are related to the associations between smoking and religiosity. This also could have influenced the observed pattern of associations. Addressing smoking with demonstrated religion as well as family and friends has to be part of the intervention: it cannot be separated from the other elements. In a Muslim country, religion is embedded in family and the social life of a child. We surmise that any effective intervention will need to account for all elements of the child's environment.

The construction of the wealth index for this study was based on a limited number of asset variables. Family gross income was not included as a confounder and was reported to be associated with WP smoking among students in Jordan (Azab et al., 2010) and family size was not examined to estimate its impact on cigarette and WP smoking. We failed also to include media use (including internet access), sporting or cultural activities to estimate their impact on smoking because the questionnaire was limited by space, that is, respondent burden. These would be useful factors to examine in future research.

A further limitation was that smoking status was not verified by laboratory specimen tests. However, Kheirallah et al. (2016) have argued that self-reported data should not be criticised for validity as adolescent self-reports of tobacco use have been demonstrated to be accurate in earlier studies (Wills & Cleary, 1997).

This research was based on a stratified cluster sample where only 1 or 2 clusters were sampled by stratum, thus preventing use to generalise our results to nonparticipants. Although two waves of the survey were examined, the repeated cross-sectional design of the survey does not allow for causality to be examined (Saunders & Geletko, 2012), which prevents us from making causal inferences about whether Devotion & Practice predicts important tobacco use milestones in adolescence such as initiation and transition to regular use.

7.6 Public health and health promotion implications

The field of public health emphasises a broad-based view of factors that are associated with smoking rather than a narrow biomedical view of smoking as a behaviour choice. This is supported by the Ottawa Charter for Health Promotion (see Figure 10) which mentions the cornerstones of health promotion as strengthening community action, developing personal skills, creating supportive environments and re-orienting health services (World Health Organization, 1986).



Figure 10. *Ottawa Charter for Health Promotion (HSC PDHPE, n.d.)*

The following implications are therefore broad-based and have been designed from a public health perspective and a religious perspective. The associations between family, friends and individual attitudes and smoking have broader implications that are based on the holistic factors of health to be adopted: encompassing physical, religious, social and mental well-being. The social aspect encompasses friends and family while the intellectual aspect will involve personal and attitudinal factors.

Based on the application of the current findings, the following are public health and health promotion implications of this study.

- 1) The Ottawa Charter emphasises the need for strengthening community action as a cornerstone of health promotion. In this instance, the participation of religious leaders and experts is essential when creating health prevention programs for smoking. Indeed it has been shown that religiosity is an important element in the lives of the majority of Jordanian population including the present sample of primary school students. A practical implication of the present result is the possibility of using religious devotion & practice in dealing with smoking cigarettes and WP in Muslim youth, thus anchoring most of the tobacco prevention measures on religion. This may include involving religious authorities when planning smoking prevention programmes for any age group, thus making use of significant figures, which is a recommended strategy in public health (World Health Organization, 1986). Furthermore, the religious organisations need to resolve differences in opinion and reach a consensus about the haram status of cigarettes and WP smoking.
- 2) The Ottawa Charter also stresses the need for building healthy public policies, thus regulation and laws are also cornerstones of public health interventions. A review of literature in this study indicated that tobacco smoking appears to be a trend in MENA countries (Alzaabi et al., 2016; Kheirallah et al., 2016; Maziak et al., 2014). This has implications for the need to introduce laws that can counter the international influence to smoking cigarettes and WP. Jordan can also come up with strategies of spreading its smoking ban laws to other countries thereby ensuring international collaboration, which is one of the cornerstones of public health. The WHO Framework Convention on Tobacco Control (FCTC) (World Health Organization, 2003) can be used as a model of international collaboration, although its main emphasis is inter-sectoral tobacco control policy strategy.

- 3) Some of the traditional strategies of disapproval in health promotion action appear to be important in this study. These can be parental or religious, and they appear to have grounding in this work and therefore this finding has implications for the reconsideration of applying religious penalties (*fatwa*) for smoking at all levels, family, peer and social. Muslim elders can use the tool developed in this work as a framework for making smoking *haram*.
- 4) The Ottawa Charter also includes “Developing personal skills” as an action area (World Health Organization, 1986). The importance of personal factors demonstrated in this study may have implications for consideration of ways to improve students’ internal locus of control. Such strategies would help students to resist external pressure from other individuals such as peers, as this research suggests a very strong role of peer influence. The internal locus of control appeals to the intellectual and moral aspects of behaviour and hence such strategies will improve the moral reasoning of children.
- 5) Still under the “Developing personal skills” action area from the Ottawa Charter, the importance of parental smoking and attitudes demonstrated in this work has implications for consideration of addressing quit-smoking messages not only to children but to parents also.
- 6) In terms of inter-sectoral collaboration as described in the WHO FCTC, the industry and business sectors must be involved in efforts toward youth-smoking prevention, insofar as they provide products and settings for tobacco smoking (Salloum et al., 2016).
- 7) Considering the Ottawa Charter action area of “Building healthy public policies”, a need exists for policy action in schools. According to the results from this study, increasing the knowledge about the ruling of smoking in Islam as *haram* in conjunction with encouraging Devotion and practice may have a positive impact

on both WP and cigarettes smoking among adolescents. Implementation of a programme along these lines therefore may necessitate policy changes in schools that are related to curriculum content, especially content incorporating Islamic views, which positively affects health and Islam-related knowledge among adolescents (Tahlil, Woodman, Coveney, & Ward, 2013).

- 8) Again within the domain of the “Building healthy public policies” from the Ottawa Charter, tobacco smoking policies should take a developmental or lifespan approach targeting primary years, secondary education years, tertiary education years and other adult stages. Such a lifespan approach is also encompassed by the “Reorienting health services” area of the Ottawa Charter. This approach will not only ensure that no age is missed but also ensure that prevention, cessation and relapse phases are covered in one approach.
- 9) Within the domain of the Ottawa Charter’s “Reorienting health services” action area, a consideration to bear in mind is *time and settings* oriented policies that account for the locations where the child spends most of her or his time, e.g. the home, the school, the mosque and the Quran memorisation centres. Such an approach could link the parents, the school, the religious leaders and the government bodies to provide consistent messages. These rings should be seen as complementary to another. Implementation of such policies requires direct efforts between the private households, Ministry of Education and the Ministry of Awqaf Islamic Affairs and Holy Places.
- 10) A regular review of existing tobacco control frameworks such as the WHO FCTC should be done. Furthermore in terms of the need for reviews Jordan should revisit existing laws and bans related to smoking, which need regular updating.

- 11) An integrated use of international frameworks and standards such as the WHO FCTC and WHO MPOWER (Frieden, 2015; World Health Organization, 2003) could have benefits in reducing tobacco use and preventing premature death.
- 12) In terms of “Building healthy public policies” as provided in the Ottawa Charter: given the association of internet availability and smoking WP, policies around use of internet and the prevailing forms of social media must be implemented to control both WP and cigarette smoking. The role of the social media could be gauged and subsequently employed in efforts to disseminate messages about smoking cessation.
- 13) Finally, this study identified issues around initiation and persistence of smoking that imply a need for two-pronged approaches focusing on prevention on one hand, and on cessation in those who have already initiated smoking. Such approaches are consistent with the prevention and rehabilitation functions of public health.

7.7 Future recommendations

- Given the existence of proven frameworks such as the WHO FCTC there is a need for the government to urgently take action on some elements of these frameworks. For example through these WHO FCTC frameworks there are already taxations and bans of smoking in public places. The current effectiveness of these may be boosted through innovative approaches based on evaluation of current measures.
- It is suggested to devise age-specific health promotion strategies that are based on theories of development across the lifespan. These may include activating laws on the control of cigarette sales and of the availability of WP to minors in cafés. There is some evidence that, in Jordan, shop owners rarely abide by the law in regard to this type of control (The National, 2014).
- In Jordan currently there are laws about labelling cigarettes but no laws about labelling WP (World Health Organization, 2017a). It is suggested in this study that the amount of contribution of labelling in smoking could also be taken advantage in WP smoking by introducing labels (Nakkash & Khalil, 2010).
- Since the strength of religiosity was noted in this study, as well as pre-eminence of religion in Muslim life, it is suggested to appeal to the influence factors (peers, parents, school, etc.) to use religion as a tool to strengthen the harmful effects of smoking message to adolescents.
- It is suggested to strengthen the collaborative link between students, teachers and religious leaders so that efforts to promote health will be a shared responsibility among all these stakeholders.
- There is an already compulsory Islamic curriculum through schools in Jordan. This curriculum could be improved further by initiating awareness of the harmful

effects of smoking, specifically in the following areas: science education, Islamic education, Arabic language, art education, physical education.

It is further suggested to:

- Advertise visual messages that emphasise both the medically harmful aspects of smoking and the spiritually harmful aspects of smoking as complementary strategies.
- Form an independent government agency affiliated with government ministries that deal specifically with the issue of smoking and related behaviours.
- Conduct more studies and research to evaluate the impacts and effectiveness of health promotion messages to students.
- Set up a counselling programme (face-to-face, online or phone) to offer cessation support for people wanting to quit smoking cigarettes or WP.
- Set up a counselling programmes which will have the role of rehabilitating those who are affected.
- Strengthen ways in which Islamic rulers can also be an active part of the national framework for smoking cessation programmes.
- Anchor all smoking cessation strategies to the family, peers, school and religion.
- Tap into the ubiquity of mobile technology in designing health promotion strategies.
- Encourage cooperation of social institutions such as family, school, mosque, media and schools in addressing the phenomenon of youth smoking.

7.8 Further research and significance

It is difficult to generalise the results of this study beyond the specific population of Muslim children in the state surveyed. It appears that family and siblings seem to influence students' smoking of WP more than the smoking of cigarettes. This difference is of special significance and needs more research to further validate the findings.

The current pilot study was intended to prepare the way for a potential full study in the future for population-related epidemiological quantities (prevalence and incidence of cigarette and WP smoking). The intended full study survey design is described below.

7.8.1 Intended full study design

The intended full study will consist of a longitudinal staged-sample survey among Muslim schoolchildren in grades 5 and 6 from all regions in the Hashemite Kingdom of Jordan (excluding refugees) to assess the prevalence of tobacco smoking in this age group. In addition, the schoolchildren will be followed up 12 months later in order to assess the incidence of initiation of tobacco smoking. The sampling frame will be established from a list of schools with geographical locations and number of students broken down by class, which will be obtained through the Department of Statistics of the Ministry of Education.

7.8.2 Sampling stages of intended full study

A multistage sampling plan will be conducted. In the first sampling stage, a sample of schools selected from the roster of school names using random sampling with probability proportional to size (i.e., size of the eligible student population in the schools).

In the second sampling stage, a number of students to be determined will be randomly sampled from grades 5 and 6 and invited to enrol in the study.

The total number of students eligible for recruitment in these schools is estimated to be 196,483; 145,423 in public schools and 51,060 in private schools. The sample will be

stratified based on the sex and type of school (public or private). The total number of schools is estimated to be 2,372: 712 male schools (678 public, 34 private), 251 female schools (242 public, 9 private) and 1,409 mixed-sex schools (904 public, 505 private).

7.8.1 Potential stratification of intended full study and identification of potential sociocultural confounders

The intended full study survey design is likely to be stratified by geographical location (region or governorate), type of school, authority of supervision, urban vs rural schools and by sex, on the basis of scientific interest in stratified analyses. No data collected in the course of the present study will be included in the final stratification design. An appropriate sample size calculation involving power of hypothesis tests and precision requirements on the epidemiological analysis will be conducted to determine the required study sample size.

Any further examination of the social context and its influence on smoking should account for other influences in an adolescent's life including media use (internet access), sporting and cultural activities.

Further research is intended to remove any doubt that the religiosity scale developed is not conceptually distinct from that measured by instruments such as those developed by Glock (1962) and even that of El-Menouar (2014).

7.8.2 Validation research

The factors of religiosity developed in this research still need to be tested on different child populations within the Muslim world. This study, however, has significance for the design of tailored health promotion strategies for both WP and cigarette smoking in Jordan. More research is also needed to strengthen the tool that has been developed here. The findings of this study are significant as they begin to explain the role of Islam in controlling individual smoking behaviour.

Future work should be devoted to the validation of a wealth index for use with children and youth against gold standard measures of wealth, such as annual gross family income and family size.

7.9 Conclusion

Health promotion messages based on religiosity are important because they sit in the public health philosophy of respecting the values of people who receive such messages. The tool developed here is important because it is one way of improving clinical practice by suggesting practice guidelines that respect people's culture. Public health efforts are grounded in honouring diversity and the development of this religiosity measurement tool does this in two ways: recognising age diversity and religious diversity.

The concentration of factors associated with smoking in the family structure suggests that the family should be a starting point for health promotion messages regarding smoking. This will involve a concentric model moving out from the adolescents themselves, to the parents, the siblings and then progressing further outwards to the mosque and peers. In the model we are proposing, religion will be an integral thread that joins all the component circles of the model together. This is because the religion of Islam is part of the individual, the family, the peers and other wider aspects of society. In this model, religion will also be viewed as a foundation on which all other aspects of health promotion are built, because of its strong association with smoking through the Devotion & Practice factor and its pervasiveness in all aspects of a Muslim child's life. In summary, religiosity can be used at this stage as an anchor to guide behaviour. In this work, the behaviour of interest was primary school students' choices regarding smoking of tobacco. This work has developed a scale for use with Muslim school students that consists of four factors or dimensions, which has demonstrated the ability of Islam to protect school children from the harms of smoking to some extent.

In terms of methods, this study has shown the strengths of simple and multiple variable and single-factor bivariate and multi-factor bivariate logistic regression models in testing specific hypotheses related to correlates of smoking.

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Appendices

Appendix A. Student questionnaire

a) English translation of the questionnaire



In the name of Allah the Merciful

Dear Student,

Alasalamu alaikum,

I am Tariq Al-Shatanawi, a doctoral student in the Biostatistics & Epidemiology department at Auckland University of Technology, Auckland, New Zealand. As part of my degree requirements, I am currently conducting a study that aim to assess *The Association between Religiosity and Tobacco Use among Muslim Students at Primary Schools in Irbid, Jordan*.

I am writing to ask your help in completing a survey that includes questions about religiosity and tobacco use. This will take about 20 minutes of your time. If you agree to do so, please indicate your response to each question by choosing the answer that best fits. Remember! There are no wrong or right answers and all your answers will remain completely confidential. Please be honest in your responses.

Your cooperation will contribute significantly to the success of this research aiming at evaluating the association between religiosity and tobacco use and will be extremely appreciated.

Sincerely yours,

Researcher:

Tariq Nayef Al-Shatanawi

First Part: Personal Information

- Please answer honestly on the following questions by ticking (✓) the suitable answer for you.

-Answers will remain confidential and will be used for researches purposes only.

1. Gender: Male Female
2. Grade: Fifth Sixth
3. Nationality: Jordanian Non- Jordanian
4. Religion: Muslim Non-Muslim
5. I live with: My Father and my Mother My Mother only
 My Father only Other
6. Age: Nine years and less Ten years Eleven years
 Twelve years Thirteen years and more
7. Daily Pocket Money: less than quarter of dinar Quarter dinar to less than half of dinar
 Half dinar to less than 75 piasters 75piasters to less than one dinar
 One dinar and more
8. Father's education: Tawjihi and less Diploma Bachelor Graduate (Master or PhD)
9. Mother's education: : Tawjihi and less Diploma Bachelor Graduate (Master or PhD)
10. In your household, do you have the following items :
 - A. Laptop Yes No
 - B. Flat T.V Yes No
 - C. Dining room table Yes No
 - D. Internet at home Yes No
 - E. Cell phone Yes No
 - F. Microwave Yes No
 - G. A maid Yes No
 - H. Is the house rented? Yes No

Second Part: Religiosity Scale

Please answer the questions honestly by ticking (✓) the suitable answer.

(No)	Question	Never 1	Rarely 2	Often 3	Always 4
11	I believe in the existence of Allah				
12	I believe in the holy Quran is revealed from Allah.				
13	I believe in the existence of Angels and Jinn.				
14	I believe in all the Prophets and messengers of Allah.				
15	I believe in the sacred texts that were revealed to the prophets.				
16	I believe in the Day of Judgment.				
17	I belief in fate and destiny (Predestination)				
18	I start all my acts with Basmala (the name of Allah).				
19	I make sure to pray extra prayers.				
20	I perform the prayers in the congregation.				
21	I fast voluntarily (the Arafa day or Ashura ... etc)				
22	I'm eager to attend Quran Memorization centers.				
23	I'm eager to attend of religious lessons.				
24	I feel the presence of Allah.				
25	I Praise Allah in weal and woe.				
26	I resorted to Allah in difficulty times.				
27	I resorted to Allah in prosperity times.				
28	I Committed to performing the obligatory prayer.				
29	I perform the obligatory prayers on time.				
30	I Committed fasting Ramadan.				
31	I'm eager to the obedience my parents.				
32	I'm eager to help others.				
33	I'm eager to perform my duties honestly and conscientiously.				
34	I'm eager on honesty by my sayings in various situations.				
35	I'm eager that my deeds are suitable to my words.				
36	I'm eager to ask others before borrowing their things.				
37	I keep away from cheating when dealing with others.				
38	I feel that Allah watches me all time.				
39	I feel that Allah rewards me for my good deeds.				
40	I feel that Allah punishes me for my bad deeds.				

Please choose the correct answer.					
41	The holy Quran is the words of	Angles	Prophet Muhammad	Allah	Jin
42	The holy Quran is revealed by	Jibreel (Peace be upon him)	The death angle	Israel (Peace be upon him)	Mohammed (Peace be upon him)
43	The holy Quran is revealed on	Ibrahim (Peace be upon him)	Moses (Peace be upon him)	Issa (jesus) (Peace be upon him)	Mohammed (Peace be upon him)
44	The holy Quran is revealed during the month	Rajab	Ramadan	Shawal	Sha'ban
45	The Day of judgment has a set date which is only known to	Allah alone	Allah and His prophets and messengers	Allah and Mohammed (Peace be upon him)	Allah with Some humans
46	Pilgrimage is obligatory on every abled Muslim	Every year	Twice a year	Once in lifetime	Twice in lifetime
47	Zakat is given to	Friends only	Poor and needy people	Rich people only	Relatives only
48	Friday prayer is done during the time of	Isha	Aser	Dhuhr	Fajr
49	The last prophet sent by Allah is	Ibrahim (Peace be upon him)	Moses (Peace be upon him)	Issa (jesus) (Peace be upon him)	Mohammed (Peace be upon him)
50	From the deeds done by Prophet Mohammad (Peace be upon him)?	Agriculture	Industry	Grazing sheep and Trade	Jobless
51	Prophet Mohammed (Peace be upon him) was years old at the time of revelation.	25years	30 years	40 years	50 years
52	Prophet Mohammad (Peace be upon him) was sent by Allah to.....	The people of the Arabian Peninsula	His people only	Arabs only	All people
Please answer the questions honestly by ticking (✓) the suitable answer					
53	How would you assess yourself religiously?	Not religious at all	Rather not religious	Rather religious	Very religious
54	How religious do you think your parents are?	Not religious at all	Rather not religious	Rather religious	Very religious
55	How important are religious rules in your daily life?	Not important at all	Rather not important	Rather important	Very important

The Third Part: Tobacco Use

The First Dimension: Youth Cigarette Smoking

56	Have you ever tried or experimented with cigarette smoking, even one or two puffs?	Yes	No
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If your answer is No, please answer questions 57,58

if your answer is yes, please answer question from (59-64)

57	If one of your best friends offered you a cigarette, would you smoke it?	Definitely not	Probably not	Probably yes	Definitely yes			
58	At any time during the next 12 months, do you think you will smoke a cigarette?	Definitely not	Probably not	Probably yes	Definitely yes			
59	How old were you when you first tried a cigarette?	I have never smoked cigarettes	7 years old or younger	8 or 9 years old	10 or 11 years old	12 years old	13 years or older	
60	During the past 30 days (one month), on how many days did you smoke cigarettes?	0 days	1 or 2 days	3 to 5 days	6 to 9 days	10 to 19 days	20 to 29 days	All 30 days
61	During the past 30 days (one month), on the days you smoked, how many cigarettes did you usually smoke?	I did not smoke cigarettes during the past 30 days (one month)	Less than 1 cigarette per day	1 cigarette per day	2 to 5 cigarettes per day	6 to 10 cigarettes per day	11 to 20 cigarettes per day	More than 20 cigarettes per day
62	Who were you with when you first tried a cigarette?	Alone	With parents	With other family members	With friends	Other		
63	Who are you with when you usually smoke cigarettes?	Alone	With parents	With other family members	With friends	Other		
64	During the past 30 day (one month), how did you usually get your own cigarettes?	I did not smoke cigarettes during the past 30 days (one month)	I bought them in a store, shop or from a street vendor	I gave someone else money to buy them for me	I borrowed them from someone else	I stole them	An older person gave them to me	I got them some other way

The Second Dimension: Youth Water Pipe Smoking

65	Have you ever tried or experimented with shisha smoking, even once?	Yes	No
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If your answer is No, please answer questions 66,67

if your answer is yes, please answer question from (68-73)

66	If one of your best friends offered you a shisha, would you smoke it?	Definitely not	Probably not	Probably yes	Definitely yes			
67	At any time during the next 12 months, do you think you will smoke shisha?	Definitely not	Probably not	Probably yes	Definitely yes			
68	How old were you when you first tried smoking shisha?	I have never smoked shisha	7 years old or younger	8 or 9 years old	10 or 11 years old	12 years old	13 years old or older	
69	During the past 30 days (one month), on how many days did you smoke shisha?	0 days	1 or 2 days	3 to 5 days	6 to 9 days	10 to 19 days	20 to 29 days	All 30 days

70	During the past 30 days (one month), on the days you smoked, how many shishas rocks (hagar) did you usually smoke?	I did not smoke shisha during the past 30 days (one month)	Less than 1 rock (hagar) per day	1 rock (hagar) per day	2 to 5 rock (hagar) per day	More than the above		
71	Where do you usually smoke shisha?	I have never smoked shisha	At home	At coffee shop	At a restaurant	At a friend's house	Other	
72	Who were you with when you first tried shishas?	Alone	With parents	With other family members	With friends	Other		
73	Who are you with when you usually smoke shishas?	Alone	With parents	With other family members	With friends	Other		
The Third Dimension: Family & Peer Influence								
74	Do your parents smoke Cigarettes?	None	Both	Father only	Mother only	I don't know		
75	Does anyone in your house other than your parents smoke cigarettes?	Yes	No					
76	Do any of your closest friends smoke cigarettes?	None of them	Some of them	Most of them	All of them			
77	Do your parents smoke shisha?	None	Both	Father only	Mother only	I don't know		
78	Does anyone in your house other than your parents smoke shisha?	Yes	No					
79	Do any of your closest friends smoke shisha?	None of them	Some of them	Most of them	All of them			
80	What is the ruling of smoking in Islam?	Forbidden (Haram)	Discouraged (Makruh),	Desirable	Don't Know			

81	For each of the statements listed below, please show us whether you agree or disagree with them			
Please tick one box for each statement		Agree	Disagree	Don't Know
A.	My Parents would be upset if they knew I smoke cigarettes.			
B.	My Parents would be upset if they knew I smoke water pipe.			
C.	My parents have set specific rules for not smoking cigarettes.			
D.	My parents have set specific rules for not smoking water pipe.			
E.	My parents think that it is ok for people under the age of 16 to smoke cigarettes.			
F.	My parents think that it is ok for people under the age of 16 to smoke water pipe.			



بسم الله الرحمن الرحيم

عزيزي الطالب , عزيزتي الطالبة:

السلام عليكم ورحمة الله وبركاته ، ، ،

أنا طارق شطناوي، طالب دكتوراه في قسم الإحصاء الحيوي وعلم الأوبئة في جامعة أوكلاند للتكنولوجيا، أوكلاند، نيوزلندا. وأنا حالياً أقوم بإجراء دراسة تهدف إلى تقييم العلاقة بين التدخين والتدخين بين الطلبة المسلمين في المدارس الأساسية في أربيد، الأردن وذلك استكمالاً لمتطلبات الحصول على درجة الدكتوراه. لذا أرجو مساعدتكم في الإجابة عن هذه الاستبانة، والتي تشمل أسئلة حول التدخين وتدخين السجائر والأرجيلة، حيث تستغرق مدة الإجابة (20) دقيقة تقريباً من وقتك، فإذا كنت موافقاً على القيام بذلك، يرجى الإجابة على فقرات الاستبانة وفقاً لقناعتك الشخصية، وذلك باختيار الإجابة التي تناسبك، علماً أنه لا يوجد إجابات خاطئة أو صحيحة، وسيتم التعامل مع إجاباتك بسرية تامة، يرجى الإجابة بصدق على جميع الفقرات.

أخي الطالب , أختي الطالبة، تعاونكم سيسهم إلى حد كبير في انجاح هذا البحث الذي يهدف إلى تقييم العلاقة بين التدخين والتدخين وسكيون موضع تقدير للغاية .

مع خالص التقدير

الباحث

طارق نايف شطناوي

الجزء الأول: المعلومات الشخصية

يُرجى الإجابة على فقرات المقياس بمصادقية تامة من خلال وضع إشارة (✓) على الإجابة المناسبة لك.
الإجابات ستبقى سرية وتستخدم لأغراض البحث العلمي فقط.

1. الجنس : ذكر أنثى
2. الصف : الخامس السادس
3. الجنسية: أردني غير أردني
4. الديانة : مسلم غير مسلم
5. أعيش مع: أبي وأمي أمي فقط أبي فقط آخرين
6. العمر: 9 سنوات أو أقل 10 سنوات 11 سنة 12 سنة 13 سنة فأكثر
7. مصروف الجيب اليومي:

- أقل من ربع دينار ربع دينار إلى أقل من نصف دينار
 نصف دينار إلى أقل من 75 قرش 75 قرش إلى أقل من دينار
 دينار واحد فأكثر

8. المستوى التعليمي للأب : توجيهي أو أقل دبلوم (كلية مجتمع)
 بكالوريوس دراسات عليا (ماجستير أو دكتوراه)
9. المستوى التعليمي للأم : توجيهي أو أقل دبلوم (كلية مجتمع)
 بكالوريوس دراسات عليا (ماجستير أو دكتوراه)

10. في منزلك، هل لديك العناصر التالية:

- أ. حاسوب محمول نعم لا
- ب. شاشة تلفزيون مسطحة نعم لا
- ج. طاولة غرفة طعام نعم لا
- د. إنترنت في المنزل نعم لا
- هـ. هاتف محمول نعم لا
- و. مايكرويف نعم لا
- ز. خادمة نعم لا
- ح. هل المنزل مستأجر؟ نعم لا

الجزء الثاني: مقياس التدين

يُرجى الإجابة على فقرات المقياس بمصادقية تامة من خلال وضع إشارة (✓) على الإجابة الأكثر ملاءمة لك.

الرقم (No)	الفقرة	مطلقاً (Never) 1	قليلاً (Rarely) 2	كثيراً (Often) 3	دائماً (Always) 4
11.	أؤمن بوجود الله تعالى.				
12.	أؤمن بأن القرآن الكريم منزل من عند الله تعالى .				
13.	أؤمن بوجود الملائكة والجن.				
14.	أؤمن بجميع أنبياء الله ورسله.				
15.	أؤمن بالكتب السماوية المنزلة على الأنبياء الكرام.				
16.	أؤمن بيوم القيامة.				
17.	أؤمن بالقضاء والقدر .				
18.	أبتدأ الأشياء التي أقوم بها ب (بسم الله الرحمن الرحيم).				
19.	أحرص على تأدية الصلاة النافذة (صلاة التطوع).				
20.	أحرص على تأدية الصلوات في جماعة.				
21.	أحرص على صيام التطوع (يوم عرفه أو عاشوراء ...الخ).				
22.	أحرص على الالتحاق بمراكز تعليم القرآن الكريم.				
23.	أحرص على حضور الدروس الدينية.				
24.	أشعر بوجود الله تعالى.				
25.	أحمد الله في السراء والضراء .				
26.	ألتجئ إلى الله تعالى في أوقات الشدة.				
27.	ألتجئ إلى الله تعالى في أوقات الرخاء .				
28.	أحافظ على أداء الصلاة المفروضة.				
29.	ألتزم بأداء الصلوات المفروضة في أوقاتها .				
30.	ألتزم بصيام شهر رمضان الكريم.				
31.	أحرص على طاعة والدي.				
32.	أحرص على مساعدة الآخرين.				
33.	أحرص على أداء واجباتي بصدق وأمانة.				
34.	أحرص على الصدق بأقوالي في مختلف المواقف.				
35.	أحرص أن تكون أفعالي منسجمة مع أقوالي.				
36.	أستأذن الآخرين عند أخذ ممتلكاتهم.				
37.	أبتعد عن الغش أثناء التعامل مع الآخرين.				
38.	أشعر بأن الله تعالى يراقبني في السر والعلن.				
39.	أشعر بأن الله يكافئني على تصرفاتي الحسنة.				
40.	أشعر بأن الله يعاقبني على تصرفاتي السيئة.				

الرجاء اختيار الإجابة التي تعتقد أنها صحيحة.

41.	القرآن الكريم هو كلام ...	الملائكة	النبي محمد عليه السلام	الله تعالى	الجن
42.	أنزل القرآن الكريم بواسطة	جبريل عليه السلام	ملك الموت عليه السلام	إسرائيل عليه السلام	محمد عليه السلام
43.	أنزل القرآن الكريم على ...	إبراهيم عليه السلام	موسى عليه السلام	عيسى عليه السلام	محمد عليه السلام
44.	أنزل القرآن الكريم خلال شهر ...	رجب	رمضان	شوال	شعبان
45.	موعد يوم القيامة لا يعلمه إلا ...	الله تعالى وحده	الله تعالى وأنبيأه ورسله	الله تعالى ومحمد عليه السلام	الله تعالى وبعض البشر
46.	الحج فرض على كل مسلم قادر ...	مرة كل سنة	مرتين في السنة	مرة واحدة في العمر	مرتين في العمر
47.	تُعطى الزكاة ل ...	الأصدقاء فقط	الفقراء والمحتاجين	الأغنياء فقط	الأقارب فقط
48.	تقام صلاة الجمعة وقت ...	العشاء	العصر	الظهر	الفجر
49.	خاتم الأنبياء والمرسلين هو ...	إبراهيم عليه السلام	موسى عليه السلام	عيسى عليه السلام	محمد عليه السلام
50.	من بين الأعمال التي قام بها الرسول (صلى الله عليه وسلم) ؟	الزراعة	الصناعة	رعي الأغنام والتجارة	لم يعمل
51.	كان عمر النبي محمد (صلى الله عليه وسلم) عاماً عندما بدأ نزول الوحي عليه.	25 عاماً	30 عاماً	40 عاماً	50 عاماً
52.	أرسل الله تعالى النبي محمد (صلى الله عليه وسلم) إلى ...	أهل الجزيرة العربية	قومه فقط	العرب فقط	كافة الناس
يُرجى الإجابة بمصادقية تامة من خلال وضع إشارة (✓) على الإجابة الأكثر ملاءمة لك.					
53.	كيف تقيم نفسك من الناحية الدينية؟	غير متدين إطلاقاً	متدين قليلاً	متدين غالباً	متدين جداً
54.	كيف تقيم والديك من الناحية الدينية؟	غير متدين إطلاقاً	متدين قليلاً	متدين غالباً	متدين جداً
55.	ما مدى أهمية القواعد الدينية في حياتك اليومية؟	غير مهم إطلاقاً	غير مهم	مهم	مهم جداً

الجزء الثالث : التدخين

التبعد الأول: تدخين الشباب للسجائر							
56.	هل سبق لك ان دخنت السجائر، لو نفخه أو نفختين؟	لا	نعم				
إذا كانت إجابتك على هذا السؤال (لا)، الرجاء الإجابة على السؤالين (57، 58).							
إذا كانت إجابتك على هذا السؤال (نعم)، الرجاء الإجابة على الأسئلة من (59 - 64).							
57.	إذا عرض عليك أحد أفضل أصدقائك سيجارة، هل تقوم بتدخينها؟	لا	بالتأكيد لا	على الأغلب لا	على الأغلب نعم	بالتأكيد نعم	
58.	هل تعتقد أنك سوف تدخن سيجارة في أي وقت خلال السنة المقبلة (12 شهر)؟	لا	بالتأكيد لا	على الأغلب لا	على الأغلب نعم	بالتأكيد نعم	
59.	كم كان عمرك عندما حاولت تدخين السجائر لأول مرة؟	7 سنوات أو أقل	8 سنوات أو 9 سنوات	10 سنوات أو 11 سنة	12 سنة	13 سنة فأكثر	
60.	كم يوماً دخنت فيه السجائر خلال 30 يوماً الماضية (الشهر الماضي)؟	ولا يوم	يوم أو يومين	من 3 - 5 أيام 3 to 5 days	من 6 - 9 أيام	من 10 - 20 يوماً	30 يوماً (كل الثلاثين يوماً)
61.	كم سيجارة كنت تدخن باليوم خلال الأيام التي دخنت فيها في الشهر الماضي ؟	لم أذخن أي سيجارة خلال الشهر الماضي	أقل من سيجارة واحدة باليوم	سيجارة واحدة يومياً	من 2-5 سجائر يومياً	من 6-10 سجائر يومياً	من 11-20 سيجارة يومياً أكثر من 20 سيجارة يومياً
62.	مع من حاولت تدخين أول سيجارة؟	وحدى	مع والدي	مع فرد من أفراد العائلة	مع الأصدقاء	أخرى	
63.	مع من تدخن السجائر عادة؟	وحدى	مع والدي	مع فرد من أفراد العائلة	مع الأصدقاء	أخرى	
64.	خلال الشهر الماضي، كيف حصلت على السجائر الخاصة بك؟	لم أذخن السجائر خلال الشهر الماضي	اشتريتها من محل (متجر) أو من بائع متجول	أعطيت المال لشخص آخر لشراؤها لي	اقتترضتها من شخص آخر	سرقتها	أعطاني إياها شخص أكبر مني سناً بطريقة أخرى
التبعد الثاني: تدخين الشباب للأرجيلة (الشيخة)							
65.	هل سبق لك أن حاولت أو جربت تدخين الأرجيلة (الشيخة)، ولو مرة واحدة؟	لا	نعم				
إذا كانت إجابتك على هذا السؤال (لا)، الرجاء الإجابة على السؤالين (66، 67).							
إذا كانت إجابتك على هذا السؤال (نعم)، الرجاء الإجابة على الأسئلة من (68 - 72).							
66.	إذا عرض عليك أحد أفضل أصدقائك أرجيلة، هل تقوم بتدخينها؟	لا	بالتأكيد لا	على الأغلب لا	على الأغلب نعم	بالتأكيد نعم	

67.	هل تعتقد أنك سوف تدخن الأرجيلة في أي وقت خلال السنة المقبلة (12 شهر)؟	لا	لا	على الأغلب لا	على الأغلب نعم	بالتأكيد نعم		
68.	كم كان عمرك عندما حاولت تدخين الأرجيلة (الشيقة)، لأول مرة؟	لم أكن التدخين إطلاقاً	أقل من 7 سنوات أو 7 سنوات أو 8 سنوات أو 9 سنوات	8 سنوات أو 9 سنوات	10 سنوات أو 11 سنة	12 سنة	13 سنة	فأكثر
69.	خلال الأيام الثلاثين الماضية (شهر واحد)، كم عدد الأيام التي دخنت فيه الأرجيلة (الشيقة)؟	ولا يوم	يوم أو يومين	من 3 - 5 أيام	من 6 - 9 أيام	من 10 - 19 يوم	من 20 - 29 يوم	30 يوماً
70.	خلال الأيام الثلاثين الماضية (شهر واحد)، وفي الأيام التي كنت تدخن فيها، كم رأس أرجيلة (شيقة) قمت بتدخينه؟	لم أكن التدخين إطلاقاً	أقل من رأس	رأس شيقة واحد يومياً	من 2 - 5 رؤوس شيقة يومياً	أكثر مما سبق		
71.	أين تدخن الأرجيلة (الشيقة) عادة؟	لا أكن التدخين	في البيت	في مقهى	في مطعم	في منزل أحد الأصدقاء	أخرى	
72.	مع من حاولت تدخين أول أرجيلة؟	وحدتي	مع والدي	مع فرد من أفراد العائلة	مع الأصدقاء	أخرى		
73.	مع من تدخن الأرجيلة عادة؟	وحدتي	مع والدي	مع فرد من أفراد العائلة	مع الأصدقاء	أخرى		
التباعد الثالث : تأثير الأسرة والأقران								
74.	هل يدخن والداك السجائر؟	لا	كلاهما	والذي فقط	والذي فقط	لا أعرف		
75.	هل يوجد أحد في منزلك غير والديك يدخن السجائر؟	نعم	لا					
76.	هل يوجد أحد من أصدقائك المقربين يدخن السجائر؟	لا يوجد	بعضهم	أغلبهم	جميعهم			
77.	هل يدخن والداك الأرجيلة (الشيقة)؟	لا	كلاهما	والذي فقط	والذي فقط	لا أعرف		
78.	هل يوجد أحد في منزلك غير والديك يدخن الأرجيلة (الشيقة)؟	نعم	لا					
79.	هل يوجد أحد من أصدقائك المقربين يدخن الأرجيلة (الشيقة)؟	لا يوجد	بعضهم	أغلبهم	جميعهم			
80.	ما هو حكم التدخين في الإسلام؟	حرام	مكروه	مستحب	لا أعرف			

6

81.	الرجاء وضع إشارة (✓) في المربع المناسب بما يتناسب مع قناعتك الشخصية (موافق، غير موافق، لا أعرف) للفقرات الآتية:				
	الفقرة	موافق	غير موافق	لا أعرف	
أ.	سيكون والدي محبطان إذا علموا أنني أكن السجائر .				
ب.	سيكون والدي محبطان إذا علموا أنني أكن الأرجيلة.				
ج.	وضع والدي مجموعة قواعد محددة حول عدم تدخين السجائر .				
د.	وضع والدي مجموعة قواعد محددة حول عدم تدخين الأرجيلة.				
هـ.	يظن والدي أن تدخين السجائر مقبول للأطفال التي تقل أعمارهم عن 16.				
و.	يظن والدي أن تدخين الأرجيلة مقبول للأطفال التي تقل أعمارهم عن 16.				

Appendix B. Ethics approval-phase one from Auckland University of Technology Ethics Committee



AUTEC Secretariat

Auckland University of Technology
D-88, WU406 Level 4 WU Building City Campus
T: +64 9 921 9999 ext. 8316
E: ethics@aut.ac.nz
www.aut.ac.nz/researchethics

AUT

1 December 2015

Nick Garrett
Faculty of Health and Environmental Sciences

Dear Nick

Re Ethics Application: **15/376 The association between religiosity and tobacco-use among primary Muslim school students in Jordan.**

Thank you for providing evidence as requested, which satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTEC).

Your ethics application has been approved for three years until 1 December 2018.

This approval is for the first stage of this research only and covers the initial round of questions. Full information about the later stages of the research needs to be provided to and approved by AUTEC before any recruitment or data collection for those stages occurs.

As part of the ethics approval process, you are required to submit the following to AUTEC:

- A brief annual progress report using form EA2, which is available online through <http://www.aut.ac.nz/researchethics>. When necessary this form may also be used to request an extension of the approval at least one month prior to its expiry on 1 December 2018;
- A brief report on the status of the project using form EA3, which is available online through <http://www.aut.ac.nz/researchethics>. This report is to be submitted either when the approval expires on 1 December 2018 or on completion of the project.

It is a condition of approval that AUTEC is notified of any adverse events or if the research does not commence. AUTEC approval needs to be sought for any alteration to the research, including any alteration of or addition to any documents that are provided to participants. You are responsible for ensuring that research undertaken under this approval occurs within the parameters outlined in the approved application.

AUTEC grants ethical approval only. If you require management approval from an institution or organisation for your research, then you will need to obtain this. If your research is undertaken within a jurisdiction outside New Zealand, you will need to make the arrangements necessary to meet the legal and ethical requirements that apply there.

To enable us to provide you with efficient service, please use the application number and study title in all correspondence with us. If you have any enquiries about this application, or anything else, please do contact us at ethics@aut.ac.nz.

All the very best with your research,

Kate O'Connor
Executive Secretary
Auckland University of Technology Ethics Committee

Cc: Tariq Al-Shatanawi ta.shata@aut.ac.nz, Alain Vandal

Appendix C. Ethics approval-phase two from Auckland University of Technology Ethics Committee



AUT

AUTEC Secretariat

Auckland University of Technology
D-88, WU406 Level 4 WU Building City Campus
T: +64 9 921 9999 ext. 8316
E: ethics@aut.ac.nz
www.aut.ac.nz/researchethics

15 March 2017

Nick Garrett
Faculty of Health and Environmental Sciences

Dear Nick

Re Ethics Application: **16/399 The association between religiosity and tobacco use among Muslim students at primary schools in Irbid, Jordan**

Thank you for providing evidence as requested, which satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTEC).

Your ethics application has been approved for three years until 15 March 2020.

As part of the ethics approval process, you are required to submit the following to AUTEC:

- A brief annual progress report using form EA2, which is available online through <http://www.aut.ac.nz/researchethics>. When necessary this form may also be used to request an extension of the approval at least one month prior to its expiry on 15 March 2020;
- A brief report on the status of the project using form EA3, which is available online through <http://www.aut.ac.nz/researchethics>. This report is to be submitted either when the approval expires on 15 March 2020 or on completion of the project.

It is a condition of approval that AUTEC is notified of any adverse events or if the research does not commence. AUTEC approval needs to be sought for any alteration to the research, including any alteration of or addition to any documents that are provided to participants. You are responsible for ensuring that research undertaken under this approval occurs within the parameters outlined in the approved application.

AUTEC grants ethical approval only. If you require management approval from an institution or organisation for your research, then you will need to obtain this. If your research is undertaken within a jurisdiction outside New Zealand, you will need to make the arrangements necessary to meet the legal and ethical requirements that apply there.

To enable us to provide you with efficient service, please use the application number and study title in all correspondence with us. If you have any enquiries about this application, or anything else, please do contact us at ethics@aut.ac.nz.

All the very best with your research,

Kate O'Connor
Executive Secretary
Auckland University of Technology Ethics Committee

Cc: ta.shata@aut.ac.nz; Alain Vandal; talshata@aut.ac.nz

Appendix D. Letter from Auckland University of Technology to Ministry of Education of Jordan to facilitate the survey

a) *English version*



Hashemite Kingdom of Jordan
His Excellency the Minister of Education

Subject: Facilitate the student's Tariq Nayef Al-Shatanawi survey.

Peace and mercy of God be upon you.

The student Tariq Nayef Al-Shatanawi, university ID number (1317144), is undertaking a research project about "*The Association between Religiosity and Tobacco Use among Muslim Students at Primary Schools in Jordan*", which is a part of the requirements for obtaining a doctoral degree in Public Health (Biostatistics and Epidemiology). This research project will apply a survey (by answering online questions) in two phases; The first phase will be in the first semester of the academic year 2015/2016, and the second phase in the first semester of the academic year 2016/2017, on a sample of fifth and sixth grade students in public and private schools in the governorate of Irbid.

Kindly agree to facilitate the above-mentioned student's survey.

Thank you for your cooperation

With due respect

Head of School of Public Health and Psychosocial Studies
Janis Paterson Professor
Auckland University of Technology / New Zealand

b) Arabic version



Private Bag 92006
Auckland 1142, NZ
T: +64 9 921 9999
www.aut.ac.nz

AUT

المملكة الأردنية الهاشمية

معالي وزير التربية والتعليم الأكرم

الموضوع : تسهيل مهمة الطالب طارق نايف جبر الشطناوي

السلام عليكم ورحمة الله تعالى وبركاته

يقوم الطالب طارق نايف جبر الشطناوي ، ورقمه الجامعي (1317144) ، بدراسة بعنوان " العلاقة بين التدخين و التدخين بين الطلبة المسلمين في المدارس الأساسية في الاردن " ، وذلك استكمالاً للحصول على درجة الدكتوراه في الصحة العامة (الإحصاء الحيوي والبيانات) ، ويستدعي ذلك تطبيق أداة الدراسة من خلال (إجابة الأسئلة على الحاسوب) على مرحلتين: الأولى في الفصل الدراسي الأول للعام الدراسي 2016/2015، والثانية في الفصل الدراسي الأول للعام الدراسي 2017/2016 على عينة من طلبة الصف الخامس والسادس في المدارس الحكومية والخاصة التابعة لمديرياتكم في محافظة اربد .

أرجو التكرم بالإطلاع والموافقة على تسهيل مهمة الطالب المذكور اعلاه .

شاكراً لكم حسن تعاونكم

وتفضلوا بقبول فائق الاحترام ...

رئيس كلية الصحة العامة والدراسات النفسية
الأستاذ الدكتور جانيس باترسون
جامعة أوكلاند للتكنولوجيا / نيوزيلندا
Jani Paterson

Appendix E. Support letter from Ministry of Education in Jordan

a) *English version*



**Ministry of education
Directorate of education of Irbid district**

Number: KA/7/13/8498
Date: 28/9/2015

Headmaster /Headmistress.....

Subject: Facilitate the student's Tariq Nayef Al-Shatanawi survey.

Peace and mercy of God be upon you

Referring to the book of Auckland University of Technology New Zealand number(), dated(/ /) The student Tariq Nayef Al-Shatanawi is committing a survey about " ***The Association between Religiosity and Tobacco Use among Muslim Students at Primary Schools in Jordan*** ", which is a part for the requirements for obtaining a doctoral degree in public health (Biostatistics and Epidemiology) , and that requires applying the study (by answering online questions) in two phases ; the first in the first semester of the academic year 2015/2016 , and the second in the first semester of the academic year 2016/2017, on a sample of fifth and sixth grade students in public and private schools in the governorate of Irbid.

Kindly agree to facilitate the above-mentioned student's survey.

Thank you for your cooperation

With due respect

Director of education

Stamp

Copy for Head of Training and Rehabilitation and Educational Supervision Department

Tel: (7275967-8-9)

Post box:(1483)

Fax: (7274569)

b) Arabic version

بسم الله الرحمن الرحيم



وزارة التربية والتعليم
مديرية التربية والتعليم للواء قصبة اربد

الرقم ٧٤٩٨
١٧/٧/٢٠١٦ م

التاريخ ١٤٣٧/١٢/١٤ هـ

الموافق ١٧/٧/٢٠١٦ م

مدير / مديرة مدرسة المحترم

الموضوع/تسهيل مهمة

السلام عليكم ورحمة الله وبركاته...

اشارة إلى كتاب جامعة اوكلاند للتكنولوجيا / نيوزيلندا رقم بلا. تاريخ بلا. يقوم الطالب / طارق نايف جبر الشطناوي بدراسة بعنوان -العلاقة بين التدخين والتدخين بين الطلبة المسلمين في المدارس الأساسية في الأردن - وذلك استكمالاً لمتطلبات الحصول على درجة الدكتوراه في الصحة العامة / تخصص الإحصاء الحيوي والوبائيات . ويحتاج ذلك تطبيق أداء الدراسة - استبانته على الحاسوب - وتوزيعها على عينة من طلبة الصف الخامس والسادس الأساسيين في مدرستكم. وذلك على مرحلتين : الأولى في الفصل الدراسي الأول للعام الدراسي 2015/2016 م. والثانية في الفصل الدراسي الأول للعام الدراسي 2016/2017 م . يرجى التكرم بتسهيل مهمة الطالب المذكور وتقديم المساعدة الممكنة له.

وتفضلوا بقبول فائق الاحترام

مدير التربية والتعليم

عائشة عفتة الدروبي

نسخة للسيد / ر.ق. الإشراف التربوي

م.خ

فاكس : (7274569)

ص . ب . (1483)

هاتف : (7275967-8-9)

بسم الله الرحمن الرحيم



وزارة التربية والتعليم
مديرية التربية والتعليم لواء بني عبيد

الرقم: ٨٠٦ / ١٣ / ٧ / ٤٤

التاريخ: ١٤ / ١٣ / ٢٠١٦

الموافق: ٢٨ / ٩ / ١٤٠٥ هـ

والخاصة

السادة مديرو ومديرات المدارس الحكومية المحترمين

الموضوع: تسهيل مهمة

السلام عليكم ورحمة الله وبركاته

اشارة لكتاب جامعة اوكلاند للتكنولوجيا / نيوزيلندا رقم بلا . تاريخ بلا .
يقوم الطالب طارق نايف جبر الشطناوي بدراسة بعنوان " العلاقة بين التدين والتدين بين الطلبة المسلمين
في المدارس الاساسية في الاردن" وذلك استكمالاً لمتطلبات الحصول على درجة الدكتوراه في الصحة العامة ،
تخصص الإنصاء الحيوي والبياتيات ، ويستدعي ذلك تطبيق أداة الدراسة "استبيانته على الحاسوب"
وتوزيعها على عينة من طلبة الصف الخامس والسادس الأساسيين في مدارسكم، وذلك على مرحلتين الأولى:
شئ الفصل الدراسي الأول للعام الدراسي 2015/2016 والثانية في الفصل الدراسي الأول للعام الدراسي
2016/2017 أرجو تسهيل مهمة الطالب المذكور أعلاه وتقديم المساعدة الممكنة له.

وتفضلوا بقبول فائق الاحترام

مدير التربية والتعليم

مدير الشؤون التعليمية والفنية
فاسم حسن الشبول

نسخة / مدير الشؤون التعليمية والفنية .

نسخة / ر.ق. التدريب والتأهيل والإشراف التربوي،
المرفقات عدد (7)

المملكة الأردنية الهاشمية

تلفون 9626507181 + فاكس 962 6 5666019 + ص ب: 1646 عمان 11118 الأردن. الموقع الإلكتروني: www.moe.gov.jo

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



وزارة التربية والتعليم

مديرية التربية والتعليم للواء الرمثا

الرقم: /١٧/
التاريخ:
الموافق: ٢٠١٥/٩/٢٩

مدير / مديرة مدرسة: المحترم

الموضوع : تسهيل مهمة الطالب

السلام عليكم ورحمة الله وبركاته:

إشارة لكتاب جامعة أوكلاند للتكنولوجيا / نيوزلندا رقم بلا، يقوم الطالب/ طارق نايف جبر الشطناوي بدراسة بعنوان "العلاقة بين التدخين والتدخين بين الطلبة المسلمين في المدارس الأساسية في الأردن"، وذلك استكمالاً لمتطلبات الحصول على درجة الدكتوراه في الصحة العامة/ تخصص الإحصاء الحيوي والوبائيات، ويستدعي ذلك تطبيق أداة الدراسة "استبانة على الحاسوب" وتوزيعها على عينة من طلبة الصف الخامس والسادس الأساسيين في مدرستكم، وذلك على مرحلتين: الأولى في الفصل الدراسي الأول للعام الدراسي ٢٠١٥/٢٠١٦م، والثانية في الفصل الدراسي الأول للعام الدراسي ٢٠١٦/٢٠١٧م. أرجو التكرم بتسهيل مهمة الطالب المذكور وتقديم المساعدة الممكنة له.

وتفضلوا بقبول فائق الاحترام

مدير التربية والتعليم
فائق أحمد خصاونة
مدير الشؤون الإدارية والمالية

نسخة / مدير الشؤون التعليمية والفنية
نسخة / ر. ق. الإشراف
٢٠١٥/٩/٢٩

Appendix F. Information sheet and consent forms for children (phase one)

Information sheet for children

a) English version

Thank you for completing this form.

If they feel that you understand what the project is about then give this form back to your teacher at the school tomorrow please.

Researcher Name: Tariq Al-Shatanawi

Mobil: +962772207136

Email: talshata@aut.ac.nz

WHAT DO I DO IF I HAVE CONCERNS ABOUT THIS RESEARCH?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor

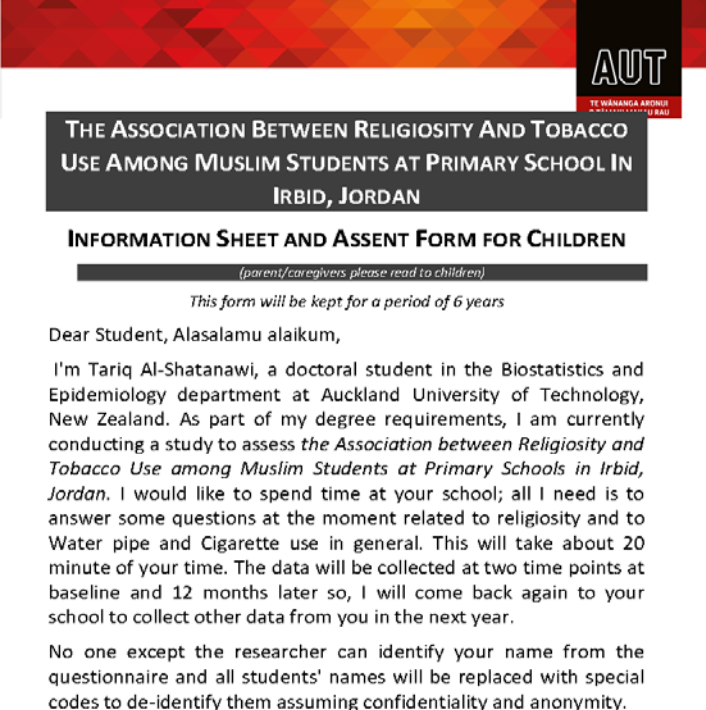
Name: Dr Nick Garrett

Email address: ngarrett@aut.ac.nz

Phone number: ++6499219999 Xtn 7773

Concerns regarding the conduct of the research should be notified to the Executive Secretary, AUTC, Kate O'Connor, ethics@aut.ac.nz, 921 9999 ext 6038.

Approved by the Auckland University of Technology Ethics Committee on *type the date final ethics approval was granted*, AUTC Reference number *type the reference number*.



The image shows a document titled "THE ASSOCIATION BETWEEN RELIGIOSITY AND TOBACCO USE AMONG MUSLIM STUDENTS AT PRIMARY SCHOOL IN IRBID, JORDAN". It is an "INFORMATION SHEET AND ASSENT FORM FOR CHILDREN" and includes a note that it should be read to children by parents/caregivers. The form is for a study by Tariq Al-Shatanawi at Auckland University of Technology. It details the study's purpose, the researcher's contact information, and provides instructions on how to handle concerns. The document also includes the AUTC logo and a note about the form's retention period.

AUT
TE WĀNANGA ARONGI
UNIVERSITY OF TECHNOLOGY
AUCKLAND

THE ASSOCIATION BETWEEN RELIGIOSITY AND TOBACCO USE AMONG MUSLIM STUDENTS AT PRIMARY SCHOOL IN IRBID, JORDAN

INFORMATION SHEET AND ASSENT FORM FOR CHILDREN

(parent/caregivers please read to children)

This form will be kept for a period of 6 years

Dear Student, Alasalamu alaikum,

I'm Tariq Al-Shatanawi, a doctoral student in the Biostatistics and Epidemiology department at Auckland University of Technology, New Zealand. As part of my degree requirements, I am currently conducting a study to assess *the Association between Religiosity and Tobacco Use among Muslim Students at Primary Schools in Irbid, Jordan*. I would like to spend time at your school; all I need is to answer some questions at the moment related to religiosity and to Water pipe and Cigarette use in general. This will take about 20 minute of your time. The data will be collected at two time points at baseline and 12 months later so, I will come back again to your school to collect other data from you in the next year.

No one except the researcher can identify your name from the questionnaire and all students' names will be replaced with special codes to de-identify them assuming confidentiality and anonymity.

You will know that I am not one of your teachers. You can talk to me and we can get to know each other. You can ask me about my work whenever you want to. Let me know how you feel about this by choosing in one of these words -

Happy *Fine*
Not Sure
Worried

If you are not sure or worried come and talk to me about it or ask one of your teachers or your parents about this.

I am finding out about religiosity and tobacco use – you might like to find out about this as well. I am not sure how to explain the word religiosity to you.

Religiosity is a comprehensive sociological term used to refer to the numerous aspects of religious activity. I am asking all of you at the school to answer questions on a complete related to religiosity and tobacco use.

Please circle **YES** if you would like to take part in answering the questions.

Please circle **NO** if you do not want to do this

Please circle **MAYBE** if you are not sure. If you cannot decide that is fine because you can come along anytime and tell me or one of your teachers or your parents that you want to join in.

This is my photo



I hope we can do this together. It will be great to meet you and you will know who I am because of my photograph. I will also wear a badge with my name on, Tariq Al-Shatanawi, when I am in your school.

b) Arabic version

أشركك لاكمال هذا النموذج

الرجاء اعادة هذا النموذج لمدرستك غدا بعد أن تقرأه وتفهمه جيدا
الباحث : طارق شطناوي

ماذا سأفعل إذا عندي اسئلة؟

اي ملاحظة حول طبيعة البحث يجب اخبار مشرف البحث فيها في البداية
اسم المشرف : نك غريت

الايمل: ngarrett@aut.ac.nz

رقم الهاتف : 006499219999 فرعي 7773

الملاحظات حول اجراءات البحث يجب اخبارها للسيدة كتي اوكونور الرئيس التنفيذي للجنة اخلاقيات في
جامعة اوكلاند للتكنولوجيا

الايمل: ethics@aut.ac.nz

رقم هاتف : 00649219999 فرعي 6038

بموافقة جامعة اوكلاند للتكنولوجيا بتاريخ / / الرقم المرجعي



TE WHANGA ARONU
UNIVERSITY OF AUCKLAND

العلاقة بين التدين والتدخين بين الطلبة المسلمين في المدارس الاساسية في اربد, الأردن.

نموذج معلومات ونموذج موافقة الطالب

(الإلهام/إلهام الأمور الرجاء قراءة النموذج لإبنتكم)

سوف يتم الاحتفاظ بهذا النموذج لمدة ست سنوات

عزيزي الطالب , عزيزتي الطالبة ,,
السلام عليكم ورحمة الله تعالى وبركاته

انا طارق شطناوي , طالب دكتوراه في قسم الاحصاء الحيوي وعلم الاوبئة في جامعة
اوكلاند للتكنولوجيا , اوكلاند- نيوزلندا . أقوم حاليا باجراء دراسة تهدف الى تقييم العلاقة
بين التدين والتدخين بين الطلبة المسلمين في المدارس الأساسية في اربد, الأردن . وذلك
استكمالا لمتطلبات الحصول على درجة الدكتوراه , كل ما اريده هو تعبئة الاستبانة
والإجابة على بعض الاسئلة المتعلقة بالاتجاهات الدينية والتدخين (الأرجيلة والسجائر)
بشكل عام.

تستغرق مدة الاجابة حوالي (20) دقيقة حيث سيتم جمع البيانات في نقطتين , الأولى في
الوقت الحالي والثانية بعد 12 شهر . لذلك سوف أعود مرة أخرى الى مدرستك لجمع
بيانات اخرى منك في العام المقبل

لا يستطيع الاطلاع على معلومات الطالب ماعدا الباحث حيث انه لن يتم استخدام اسماء اي
من الطلاب وسيتم استبدال اسماءهم برموز خاصة للتعريف بهم .

- كما تعلم أنا لست أحد مدرسيك , يمكنك التحدث معي والتعارف ويمكنك أن تسألني عن طبيعة عملي في أي وقت تريد . دعنا نعرف ماهو شعورك حول الموضوع بلختيار واحدة مما يلي :

سعيد
أشعر بارتياح
لست متأكد
قلق

- أخبرني أو أخبر أحد مدرسيك أو أحد والديك اذا كنت غير متأكد أو تشعر بالقلق .
- أنا أقوم باجراء بحث حول العلاقة بين التدين والتدخين , وربما يعجبك موضوع البحث ولكنني لست متأكد حول تصورك لمصطلح التدين .
- التدين هو مصطلح اجتماعي شامل يستخدم للإشارة إلى جوانب عديدة من النشاط الديني. اريد منك الاجابة على اسئلة هذا الاستبيان في المدرسة بشكل كامل التي تتعلق بالتدين والتدخين .

يرجى اختيار نعم اذا كنت ترغب بالاشراك بالاجابة عن الاسئلة

لا اذا كنت لا ترغب بالاجابة
يرجى اختيار

يرجى اختيار اذا كنت لست متأكد , اذا كنت غير قادر
على التقرير يمكنك ان تأتي باي وقت واخباري أنا او أحد مدرسيك برغبتك بالمشاركة .

هذه صورتي



أمل أن نتمكن من التعاون في هذا البحث ، ستعرف من أنا من خلال صورتي حيث انني سأعلق باج مطبوع عليه اسمي (طارق شطناوي) عندما أكون في مدرستكم.

Assent form (consent Forms) for children

a) English version

Assent Form

Project title: *The Association between Religiosity and Tobacco Use among Muslim Students at Primary Schools in Irbid, Jordan*

Project Supervisor: *Dr. Nick Garrett*

Researcher: *Tariq Al-Shatanawi*

- I have read and understood the sheet telling me what will happen in this study and why it is important.
- I have been able to ask questions and to have them answered.
- I understand that while the information is being collected, I can stop being part of this study whenever I want and that it is perfectly ok for me to do this.
- If I stop being part of the study, I understand that all information about me, including the recordings or any part of them that include me, will be destroyed.
- I agree to participate of the research this year.

Participant's signature:


Participant's name:

Participant Contact Details (if appropriate):
.....
.....
.....

Date:

Approved by the Auckland University of Technology Ethics Committee on *type the date on which the final approval was granted* AUTEK Reference number *type the AUTEK reference number*

Note: The Participant should retain a copy of this form.



AUT
TE WĀNANGA ARONUI
O TĀMAKI MAKĀU RAU

نموذج موافقة الطالب

عنوان البحث : العلاقة بين التدخين والتدخين بين الطلبة المسلمين في المدارس الأساسية في اربد, الأردن.

مشرف البحث : الدكتور تك عريش

الباحث : طارق نائف شطناوي

- قرأت وفهمت ورقة التعريف واطلعت على ما سيحدث في هذه الدراسة وأهميتها .
- اتبعت لي فرصة طرح الاسئلة والحصول على اجاباتها.
- اعلم انه بإمكانني الانسحاب في فترة جمع المعلومات متى رعبت دون أي مشكلة .
- اعلم انه لن يتم استخدام اسمي في أي تقرير.
- اوافق على المشاركة في هذا البحث هذا العام.

توقيع المشارك

اسم المشارك

تفاصيل الاتصال مع المشارك (إذا كان مندوباً له)

.....

.....

.....

التاريخ : / /

بموافقة جامعه اوكلنتد للتكنولوجيا بتاريخ / / الرقم المرجعي

Appendix G. Information sheet and consent forms for parents (phase one)

Parent information sheet

a) English version

Parent Information Sheet



AUT
TE WĀNANGA ARONUI
O TĀMAKI MAKĀU RAU

Date Information Sheet Produced:
...../...../.....

Project Title
The Association between Religiosity and Tobacco Use among Muslim Students at Primary Schools in Irbid, Jordan.

An Invitation

Dear parents, Alasalamu alaikum,

I'm Tariq Al-Shatanawi, a doctoral student in the Biostatistics and Epidemiology department at Auckland University of Technology, New Zealand. As part of my degree requirements, I am currently conducting a study to assess *the association between religiosity and tobacco use (Current Water pipe and Cigarette Smoking) among primary Muslim school students In Irbid, Jordan*. All I need is your child to answer some questions related to religiosity and to Water pipe and Cigarette use in general.

I would like to have your permission to let your child complete the questionnaire that includes questions about your child's religious dimension and Water Pipe and Cigarette use. This will take about 20 minute of your child's time. Student, or their parents, can choose not to answer the questions and to withdraw from the study at any time. All details about this study will be available upon request by contacting me directly or any of the school personnel.

Your cooperation, will contribute significantly to susses Islamic research studies, and will be extremely appreciated.

Sincerely,
Tariq Nayef Al-Shatanawi
Email: talshata@aut.ac.nz
Tel number: +962772207136

What is the purpose of this research?

To examine the association between religiosity and tobacco use.

How was I identified and why am I being invited to participate in this research?

The list of schools was selected with participation of ministry of education, Irbid directorate, and the researcher, your child was a part of the selected schools to participate in this research.

What will happen in this research?

The research will provide a significant answer to the relationship of Islam and health behaviours of Jordanian school student and will facilitate the proper inclusion of religious components role in improving the health of your young Jordanian Generation. Students need only to answer simple questions about religiosity and tobacco-use.

What are the discomforts and risks?

There is no discomforts and risks for participation , if the parents or the kids do not agree to participate , they can opt not answer the questions, no one except the researcher can identify your child from the questionnaire and all students' names will be replaced with special codes to de-identify them assuming confidentiality and anonymity.

How will these discomforts and risks be alleviated?

See above

What are the benefits?

All together (parents, school personnel, students, and Academic institution) can better understand the relationship between religion and tobacco-use. The role of religiosity on adapting health related behaviour will be examined.

What compensation is available for injury or negligence?

None

How will my privacy be protected?

All students' names will be replaced with special codes to de-identify them assuming confidentiality and anonymity.

What are the costs of participating in this research?

None, all data will be collected upon class convenience, no classes will be missing.

What opportunity do I have to consider this invitation?

Building better health of school students in Jordan, finding out the factors that might predict children tobacco use will help in designing appropriate intervening to prevent smoking.

How do I agree to participate in this research?

Complete consent form with my signature.

Will I receive feedback on the results of this research?

You can contact the researcher directly via email or Phone number to know about the findings of the research.

What do I do if I have concerns about this research?

Participation of student is not mandatory. Student or their parents can opt not to participate. We understand this fully and we have no problem for this participation. Concerns could be sent to the school principal, the researcher, the teacher, or any of the school personnel, all concerns are open to discuss and are greatly appreciated.

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, name: Dr. Nick Garrett

Email address: ngarrett@aut.ac.nz

Phone number: +64211073704

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTEK, Kate O'Connor, ethics@aut.ac.nz, 921 9999 ext 6038.

Whom do I contact for further information about this research?**Researcher Contact Details:**

Tariq Nayef Al-Shatanawi

Email: talshata@aut.ac.nz

Phone Number: +962772207136

Project Supervisor Contact Details:

- 1- Dr. Nick Garrett
Department of Biostatistics and Epidemiology
Auckland University of Technology – New Zealand
- 2- Dr. Nihaya Al-sheyab
Vice Dean / Faculty of Nursing
Jordan University of Science and Technology
- 3- Dr. Khalid Kheirallah
Faculty of Medicine/Dept of Public health
Jordan University of Science and Technology

Approved by the Auckland University of Technology Ethics Committee on *type the date final ethics approval was granted*, AUTEK Reference number *type the reference number*.



تاريخ إصدار ورقة المعلومات : / /

العلاقة بين التدين والتدخين بين الطلبة المسلمين في المدارس الأساسية في اربد، الأردن.

انا طارق شطنواي ، طالب دكتوراه في قسم الاحصاء الحيوي وعلم الأوبئة في جامعة اوكلاند للتكنولوجيا ،أوكلاند- نيوزلندا . أقوم حاليا بإجراء دراسة تهدف الى تقييم العلاقة بين التدين والتدخين بين الطلبة المسلمين في المدارس الإسلامية في اربد، الأردن ، وذلك استكمالاً لمتطلبات الحصول على درجة الدكتوراه . لذا أطلب مساعدتكم لاستكمال هذه الاستبانة التي تشمل أسئلة حول التدين والتدخين ، كل ما أريده هو الاذن والسماح لأبنائكم بتعبئة الاستبانة والإجابة على بعض الاسئلة المتعلقة بالاتجاهات الدينية والتدخين (الأرجيلة والسجائر) بشكل عام .

تستغرق مدة الاجابة (20) دقيقة ، يجوز للطلاب أو ولي امره الانسحاب من الدراسة في اي وقت ، النتائج النهائية سوف تكون متاحة للجميع من خلال الاتصال بالباحث شخصيا او بالمدرسة .

تعاونكم سيسهم بشكل فعّال في انجاح هذا البحث العلمي الإسلامي مع تقديرنا لجهودكم المبذولة .

مع خالص التقدير

الباحث : طارق نايف شطنواي
رقم الهاتف : 0772207136
البريد الإلكتروني: talshata@aut.ac.nz

- 1- ما الهدف من هذه الدراسة؟
 فحص العلاقة بين التدخين والتدخين .
- 2- كيف تم اختياري ولماذا تمت دعوتي للمشاركة في هذا البحث؟
 تم اختيار قلمه أسماء المدارس من قبل وزارة التربية والتعليم ومديرية التربية والتعليم في اربد والباحث , وكان ابنكم من ضمن طلاب المدارس التي تم اختيارها لهذا البحث .
- 3- ماذا سيحدث في هذا البحث ؟
 سيوفر هذا البحث اجابات هامة حول العلاقة بين الاسلام والسلوك الصحي للطلبة المسلمين في المدارس الاساسية في الاردن كما سيسهل التطبيق الصحيح للتجاهات الدينية للحفاظ على صحة الجيل الاردني الشاب.
- 4- ما هي المخاطر والمشاق ؟
 لا يوجد اي مشاق او مخاطر او ما يدعو للقلق للمشاركين حيث ان للاب والطالب الحرية التامة في اختيار مشاركتهم في البحث او عدمه , لا يستطيع احد الاطلاع على معلومات الطالب ماعدا الباحث دون استخدام اسماء الطلاب . كل اسماء الطلاب سوف تستبدل بارقام رموز خاصة للحفاظ على خصوصية الطلاب وعدم كشف هويتهم .
- 5- كيف ستحل هذه المخاطر والمشاق؟
 انظر الى الاعلى
- 6- ما هي الفوائد ؟
 نستطيع جميعا (اباء ,طلاب , الهيئة التدريسية والمدرسة) ان نفهم العلاقة بين التدخين والتدخين كما سيتم فحص دور التدخين في تكيف السلوك المرتبطة بالصحة .
- 7- ما هو التعويض المتوفر في حال الاصابة او الاهمال ؟
 لا يوجد
- 8- كيف سيتم المحافظة على الخصوصية؟
 سيتم استبدال اسماء الطلاب برموز خاصة لعدم التعريف بهم للمحافظة على خصوصيتهم .
- 9- ما هي العواقب المترتبة على المشاركة في هذا البحث؟
 ليس هنالك اي تبعات حيث سوف يتم جمع المعلومات في وقت لا يتعارض مع الحصص الصفية ولن يتم اخذ وقت الحصص.
- 10- ماهي الفرص التي سأحصلها بعين الاعتبار لتلبية هذه الدعوة؟
 بناء صحة افضل لطلاب المدارس في الاردن وإيجاد العوامل التي قد تنتج بالتدخين المستقبلي للطلاب والمساعدة في تصميم تدخل مناسب للحد من التدخين.
- 11- ماهي العملية لموافقتي باشتراكك في هذا البحث؟
 اقوم بتعبئة نموذج الموافقة مع توقيعك.
- 12- هل سأحصل على تغذية راجعة حول هذا البحث ؟
 يمكنك الاتصال مباشرة مع الباحث لتزويدك بنتائج البحث من خلال الالهيل ورقم الهاتف.
- 13- ماذا افعل اذا كانت لدي تساؤلات حول هذا البحث؟
 مشاركة الطلاب ليست اجبارية , يمكن ان يختار الاب او الطالب عدم الاشتراك بالبحث نحن متفهمين ذلك كليا وليس لدينا مشكلة في ذلك .يمكن ارسال التساؤلات الى مدير المدرسة او المدرس او اي من اعضاء المدرسة أو الباحث , جميع الملاحظات مرحب فيها وسوف يتم مناقشتها .
 يتم اشعار مشرف البحث في البداية حول اي ملاحظه حول مجريات البحث

المشرف : الدكتور نك غريت

الايمل : n Garrett@aut.ac.nz

رقم الهاتف: 0064211073704

يجب أن يتم إخطار المخاوف بشأن سير الأبحاث إلى الأمين التنفيذي للجنة أخلاقيات جامعة أوكلاند للتكنولوجيا كيت أوكونور

الايمل : ethics@aut.ac.nz

رقم الهاتف : 009649219999 رقم فرعي: 6038

14- بمن يمكنني الاتصال للحصول على معلومات إضافية حول هذا البحث ؟

- تفاصيل الاتصال مع الباحث :

الاسم : طارق نايف جبر الشملطاري

الايمل: talshata@aut.ac.nz

رقم الهاتف: 0772207136

- مشرفو البحث :

1- الدكتور نك غريت

قسم الاحصاء الحيوي وعلم الاوبئة / نيوزلندا / جامعة اوكلاند للتكنولوجيا

2- الدكتور هنيهة الشيايب

ناذب عميد كلية التمريض /جامعة العلوم والتكنولوجيا الاردنية

3- الدكتور خالد خير الله

قسم الصحة العامة /كلية الطب / جامعة العلوم والتكنولوجيا الاردنية

بمرافقة جامعة اوكلاند للتكنولوجيا بتاريخ // الرقم المرجعي

Parent/guardian consent form

a) *English version*



Parent/Guardian Consent Form

Project title: *The Association between Religiosity and Tobacco Use among Muslim Students at Primary Schools in Irbid, Jordan*

Project Supervisor: *Dr. Nick Garrett*

Researcher: *Tariq Al-Shatanawi*

- I have read and understood the information provided about this research project in the Information Sheet dated/...../.....
- I have had an opportunity to ask questions and to have them answered.
- I understand that I may withdraw my child/children and/or myself or any information that we have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way.
- If my child/children and/or I withdraw, I understand that all relevant information including tapes and transcripts, or parts thereof, will be destroyed.
- I agree to my child/children taking part in this research
- I agree to contact my child for second stage of the research next year.
- I wish to receive a copy of the report from the research (please tick one): Yes No

Child/children's name/s:

.....

Parent/Guardian's signature:

Parent/Guardian's name:

Parent/Guardian's Contact Details (if appropriate):

.....

.....

.....

Date:

Approved by the Auckland University of Technology Ethics Committee on type the date on which the final approval was granted AUTEK Reference number type the AUTEK reference number

Note: *The Participant should retain a copy of this form.*

b) Arabic version



نموذج موافقة الأباء / أولياء الأمور

عنوان البحث : العلاقة بين التدين والتدخين بين الطلبة المسلمين في المدارس الأساسية في اربيد, الأردن.

مشرف البحث : الدكتور لك عريت

الباحث : طارق نايف شملدري

- قرأت المعلومات المطروحة في ورقة التعريف عن موضوع مشروع البحث هذا بتاريخ / / وفهمتها.
- اتحت لي فرصة طرح الأسئلة والحصول على اجاباتها.
- يحق لي ان اسحب ابني /ابناتي او أي معلومة قاموا بتقديمها قبل انتهاء جمع المعلومات دون أن أعرض لأي ضرر.
- في حال تم سحب ابني/ابناتي ا و انا شخصيا من هذا الاستبيان فان جميع المعلومات المتعلقة بي او ابني او ابناتي سوف يتم حذفها.
- أوافق على مشاركته ابني في هذا البحث.
- أوافق على الاتصال مع ابني للمرحلة الثانية من البحث في العام المقبل.
- أرتغب بالحصول على التقرير النهائي لهذا البحث. نعم لا

أسم الطالب :

توقيع الأب/ولي الأمر :

اسم الأب/ولي الأمر :

وسيله الاتصال مع الأب/ولي الأمر اذا أمكن

.....

.....

.....

التاريخ : / /

بموافقة جنسه اوكلاله للتكنولوجيا بتاريخ / / الرقم المرجعي

Appendix H. Information sheet and consent forms for children (phase two)

Information sheet for children

a) English version

Thank you for completing this form.

If they feel that you understand what the project is about then give this form back to your teacher at the school tomorrow please.

Researcher Name: Tariq Al-Shatanawi

Email: talshata@aut.ac.nz

Phone Number: +962772207136

WHAT DO I DO IF I HAVE CONCERNS ABOUT THIS RESEARCH?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor

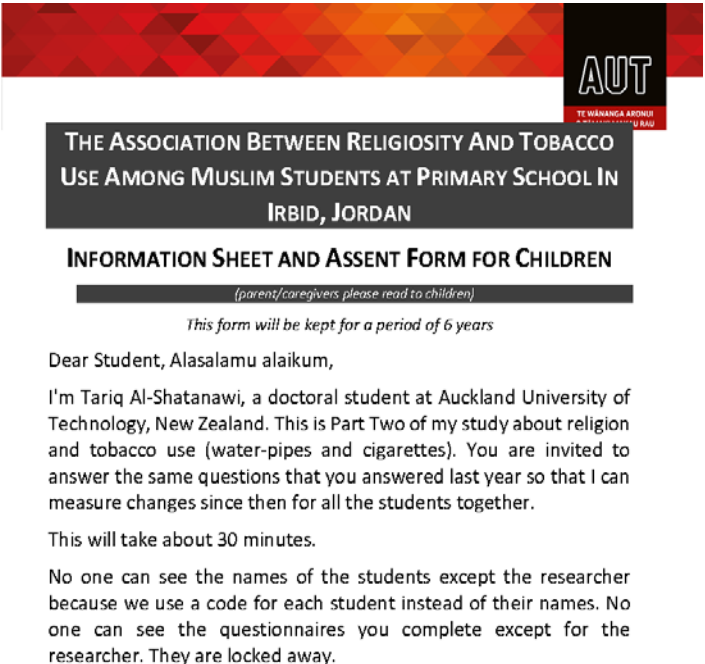
Name: Dr Nick Garrett

Email address: ngarrett@aut.ac.nz

Phone number: ++6499219999 Xtn 7773

Concerns regarding the conduct of the research should be notified to the Executive Secretary, AUTEK, Kate O'Connor, ethics@aut.ac.nz, 921 9999 ext 6038.

Approved by the Auckland University of Technology Ethics Committee on type the date final ethics approval was granted, AUTEK Reference number type the reference number.



The image shows a document titled "THE ASSOCIATION BETWEEN RELIGIOSITY AND TOBACCO USE AMONG MUSLIM STUDENTS AT PRIMARY SCHOOL IN IRBID, JORDAN". It is an "INFORMATION SHEET AND ASSENT FORM FOR CHILDREN" and includes the AUT logo (Te Wānanga āwhenua ākai). The document contains the following text:

(parent/caregivers, please read to children)
This form will be kept for a period of 6 years

Dear Student, Alasalamu alaikum,

I'm Tariq Al-Shatanawi, a doctoral student at Auckland University of Technology, New Zealand. This is Part Two of my study about religion and tobacco use (water-pipes and cigarettes). You are invited to answer the same questions that you answered last year so that I can measure changes since then for all the students together.

This will take about 30 minutes.

No one can see the names of the students except the researcher because we use a code for each student instead of their names. No one can see the questionnaires you complete except for the researcher. They are locked away.

You will know that I am not one of your teachers. You can talk to me and we can get to know each other. You can ask me about my work whenever you want to. Let me know how you feel about this by choosing in one of these words -

Happy *Fine*
Not Sure
Worried

If you are not sure or worried come and talk to me about it or ask one of your teachers or your parents about this.

I am finding out about religiosity and tobacco use – you might like to find out about this as well. I am not sure how to explain the word religiosity to you.

Religiosity is a comprehensive sociological term used to refer to the numerous aspects of religious activity. I am asking all of you at the school to answer questions on a complete related to religiosity and tobacco use.

Please circle **YES** if you would like to take part in answering the questions.

Please circle **NO** if you do not want to do this

Please circle **MAYBE** if you are not sure. If you cannot decide that is fine because you can come along anytime and tell me or one of your teachers or your parents that you want to join in.

This is my photo



I hope we can do this together. It will be great to meet you and you will know who I am because of my photograph. I will also wear a badge with my name on, Tariq Al-Shatanawi, when I am in your school.

b) Arabic version

أشركك لاكمال هذا النموذج

الرجاء اعادة هذا النموذج لمدركك غذا بعد أن تقرأه وتفهمه جيدا

الباحث : طارق نايف شطناوي

رقم الهاتف : 0772207136

الايمل: talshata@aut.ac.nz

ماذا سأفعل إذا عندي اسئلة؟

اي ملاحظة حول طبيعة البحث يجب اخبار مشرف البحث فيها في البداية

اسم المشرف : نك غريت

الايمل: ngarrett@aut.ac.nz

رقم الهاتف : 006499219999 فرعي 7773

الملاحظات حول اجراءات البحث يجب اخبارها للسيدة كاتي اوكونور الرئيس التنفيذي للجنة اخلاقيات في جامعة اوكلاند للتكنولوجيا

الايمل: ethics@aut.ac.nz

رقم هاتف : 00649219999 فرعي 6038

دراسة حسنة اوكلاند للتكنولوجيا تاريخ / / الرقم المرجعي



العلاقة بين التدخين والتدخين بين الطلبة المسلمين في المدارس
الاساسية في اربد, الأردن.

نموذج معلومات ونموذج موافقة الطالب

(الآباء/الولاء الامور الرجاء قراءة النموذج لادلائكم)

سوف يتم الاحتفاظ بهذا النموذج لمدة ست سنوات

عزيزي الطالب , عزيزتي الطالبة ,،،،،

السلام عليكم ورحمة الله تعالى وبركاته

انا طارق شطناوي , طالب دكتوراه في قسم الاحصاء الحيوي و علم الاوبئة في جامعة اوكلاند للتكنولوجيا , اوكلاند- نيوزلندا . أقوم حاليا بإجراء دراسة تهدف الى تقييم العلاقة بين التدخين والتدخين بين الطلبة المسلمين في المدارس الاساسية في اربد, الأردن , وذلك استكمالا لمتطلبات الحصول على درجة الدكتوراه , كل ما اريده هو الاجابة على نفس الاسئلة التي وزعت في الدراسة الاولى العام الماضي والاجابة على بعض الاسئلة المتعلقة بالاتجاهات الدينية والتدخين (الأرجيلة والسجائر) بشكل عام للمرحلة الثانية من هذا البحث.

تستغرق هذه الاجابة حوالي (30) دقيقة .

لا يستطيع الاطلاع على معلومات الطالب ما عدا الباحث حيث انه لن يتم استخدام اسماء اي من الطلاب وسيتم استبدال اسماءهم برموز خاصة للتعريف بهم .

- كما تعلم أنا لست أحد مدرسيك , يمكنك التحدث معي والتعارف ويمكنك أن تسألني عن طبيعة عملي في أي وقت تريد . دعنا نعرف ماهو شعورك حول الموضوع بلختيار واحدة مما يلي :

سعيد
أشعر بالارتياح
لست متأكد
قلق

- أخبرني أو أخبر أحد مدرسيك أو أحد والديك اذا كنت غير متأكد أو تشعر بالقلق .
- أنا أقوم باجراء بحث حول العلاقة بين التدخين والتدخين , وربما يعجبك موضوع البحث ولكنني لست متأكد حول تصورك لمصطلح التدخين .
- التدخين هو مصطلح اجتماعي شامل يستخدم للإشارة إلى جوانب عديدة من النشاط الديني , اريد منك الاجابة على اسئلة هذا الامتحان في المدرسة بشكل كامل التي تتعلق بالتدخين والتدخين .

نعم
يرجى اختيار اذا كنت ترغب بالاشتراك بالاجابة عن الاسئلة

لا
يرجى اختيار اذا كنت لا ترغب بالاجابة

ربما
يرجى اختيار اذا كنت لست متأكد , اذا كنت غير قادر على التقرير يمكنك ان تأتي باي وقت واخباري أنا أو أحد مدرسيك برغبتك بالمشاركة .

هذه صورتي



أمل أن تتمكن من التعاون في هذا البحث ، ستعرف من أنا من خلال صورتي حيث انني سأعلق باج مطبوع عليه اسمي (طارق شطناوي) عندما أكون في مدرستكم.

Assent form (consent forms) for children

a) English version

AUT
TE WĀNANGA ARONUI
O TĀMAKI MAKAU RAU

Assent Form

Project title: *The Association between Religiosity and Tobacco Use among Muslim Students at Primary Schools in Irbid, Jordan*

Project Supervisor: *Dr. Nick Garrett*

Researcher: *Tariq Al-Shatanawi*

- I have read and understood the sheet telling me what will happen in this study and why it is important.
- I have been able to ask questions and to have them answered.
- I understand that while the information is being collected, I can stop being part of this study whenever I want and that it is perfectly ok for me to do this.
- If I stop being part of the study, I understand that all information about me, including the recordings or any part of them that include me, will be destroyed.
- I agree to take part in the second stage of the research this year.

Participant's signature:

Participant's name:

Participant Contact Details (if appropriate):
.....
.....
.....
.....

Date:

Approved by the Auckland University of Technology Ethics Committee on type the date on which the final approval was granted AUTEK Reference number type the AUTEK reference number

Note: The Participant should retain a copy of this form.

b) Arabic version



نموذج موافقة الطالب

عنوان البحث: العلاقة بين التدخين والتدخين بين الطلبة المسلمين في المدارس الأساسية في اربد، الأردن.

مشرف البحث: الدكتور نك شريت

الباحث: طارق نايف شطناوي

- قرأت وفهمت ورقة التعريف واطلعت على ما سيحدث في هذه الدراسة وأهميتها .
- أتيت لي فرصة طرح الاسئلة والحصول على اجاباتها.
- اعلم انه بإمكانني الانسحاب في فترة جمع المعلومات متى رغبت دون أي مشكلة .
- اعلم انه لن يتم استخدام اسمي في أي تقرير.
- اوافق على المشاركة في المرحلة الثانية من البحث هذا العام.

توقيع المشارك

اسم المشارك

تفاصيل الاتصال مع المشارك (إذا كان مناسباً له)

.....

.....


.....

التاريخ: / /

بموافقة جامعه اوكلاند للتكنولوجيا بتاريخ / / الرقم المرجعي

Parent information sheet

a) English version



Parent Information Sheet

AUT
TE WĀNANGA ARONUI
O TAMAKI MAKAU RAU

Date Information Sheet Produced:
...../...../.....

Project Title
The Association between Religiosity and Tobacco Use among Muslim Students at Primary Schools in Irbid, Jordan.

An Invitation

Dear parents, Alasalamu alaikum,

I'm Tariq Al-Shatanawi, a doctoral student in the Biostatistics and Epidemiology department at Auckland University of Technology, New Zealand. As part of my degree requirements, I am currently conducting a study to assess *the association between religiosity and tobacco use (Current Water pipe and Cigarette Smoking) among primary Muslim school students In Irbid, Jordan*. All I need is for your child to answer the same questions as for the previous survey last year related to religiosity and to Water pipe and Cigarette use in general.

I would like to have your permission to let your child complete the questionnaire. It includes questions about your child's religious dimension and Water Pipe and Cigarette use. This will take about 30 minutes of your child's time. Students, or their parents, can choose not to answer the questions and to withdraw from the study at any time. All details about this study will be available upon request by contacting me directly or any of the school personnel.

Your cooperation, will contribute significantly to advancing Islamic research studies, and will be extremely appreciated.

Sincerely,
Tariq Al-Shatanawi
Email: talshata@aut.ac.nz
Tel number: +962772207136

What is the purpose of this research?

To examine the association between religiosity and tobacco use **over one year**.

The purpose of collecting information about smoking and religion twice (last year and this year) is to provide understanding about change during the important developmental stage between 6th and 7th grades.

How was I identified and why am I being invited to participate in this research?

The list of schools was selected with participation of Ministry of Education, Irbid directorate, and the researcher. Your child is a student at one of the schools selected to participate in this research.

What will happen in this research?

The research will provide significant answers to questions about the relationship between Islam and the health behaviours of Jordanian school students, and will facilitate the proper inclusion of religious components in efforts to improve the health of the younger Jordanian generation. Students need only to answer simple questions about religiosity and tobacco-use, at their desks, privately, using pen and paper questionnaires.

How do I agree to participate in this research

Parents will sign the Parent Consent Forms for their children to participate. Your child's participation in this research is voluntary (it is your and their choice). Whether or not they choose to participate will neither advantage nor disadvantage them.

Students can withdraw from the study at any time by talking to you, their teacher or any of the research team. If they choose to withdraw from the study, you will be offered the choice between having any data that is identifiable as belonging to them removed, or allowing it to continue to be used. However, once the findings have been produced, removal of their data may not be possible.

What are the discomforts and risks?

There are no discomforts and risks for participation, if the parents or children do not agree to participate, they can opt to not answer the questions. No one except the researcher can identify your child from the questionnaire and all students' names will be replaced with special codes to de-identify them assuming confidentiality and anonymity.

How will these discomforts and risks be alleviated?

No discomforts or risks are expected in this research.

What are the benefits?

All together (parents, school personnel, students, and academic institution) can better understand the relationship between religion and tobacco-use. In addition, the role of religiosity on adapting health related behaviour will be examined. Building better health of school students in Jordan, finding out the factors that might predict children tobacco use will help in designing appropriate intervening to prevent smoking.

How will my privacy be protected?

All students' names will be replaced with special codes to de-identify them assuming confidentiality and anonymity. The completed questionnaires will be secured safely in a locked cabinet at Auckland University of Technology in New Zealand.

What are the costs of participating in this research?

None, all data will be collected when it is convenient to the class and to avoid missing educational opportunities. The questionnaire is expected to take approximately 30 minutes to complete.

What opportunity do I have to consider this invitation?

You have up to one week to decide whether or not your child will take part or not.

All students in the participating classes will be invited to participate. However only Muslim students' data will be analysed because of the specific focus on Islam and small number of non-Muslim children.

How do I agree to participate in this research?

Complete consent form with your signature.

Will I receive feedback on the results of this research?

You can contact the researcher directly via email or phone to receive the findings of the research. A summary of the results will be available online at www.aut.co.nz upon completion of the research and links to the summary report will be forwarded to the participating schools for dissemination to interested parties.

What do I do if I have concerns about this research?

Concerns can be sent to the school principal, the researcher, the teacher, or any of the school personnel. All concerns are open for discussion and we welcome the opportunity to do so.

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, name: Dr. Nick Garrett

Email address: ngarrett@aut.ac.nz

Phone number: +64211073704

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTEK, Kate O'Connor, ethics@aut.ac.nz, 921 9999 ext 6038.

Whom do I contact for further information about this research?

Researcher Contact Details:

Tariq Nayef Al-Shatanawi

Email: talshata@aut.ac.nz

Phone Number: +962772207136

Project Supervisor Contact Details:

- 1- Dr. Nick Garrett
Department of Biostatistics and Epidemiology
Auckland University of Technology – New Zealand
- 2- Dr. Nihaya Al-sheyab
Vice Dean / Faculty of Nursing
Jordan University of Science and Technology
- 3- Dr. Khalid Kheirallah
Faculty of Medicine/Dept of Public health
Jordan University of Science and Technology

Approved by the Auckland University of Technology Ethics Committee on *type the date final ethics approval was granted*, AUTEK Reference number *type the reference number*.



تاريخ اصدار ورقة المعلومات : / /

العلاقة بين التدين والتدخين بين الطلبة المسلمين في المدارس الأساسية في اربد, الأردن.

انا طارق شطناوي , طالب دكتوراه في قسم الاحصاء الحيوي وعلم الأوبئة في جامعة اوكلاند للتكنولوجيا ,أوكلاند- نيوزلندا . أقوم حاليا بلجراء دراسة تهدف الى تقييم العلاقة بين التدين والتدخين بين الطلبة المسلمين في المدارس الأساسية في اربد, الأردن , وذلك استكمالاً لمتطلبات الحصول على درجة الدكتوراه . لذا أطلب مساعدتكم لاستكمال هذه الاستبانة التي تشمل أسئلة حول التدين والتدخين , كل ما أريده هو الاذن والسماح لأبنائكم بتعبئة نفس اسئلة الاستبانة التي وزعت في الدراسة الاولى العام الماضي والإجابة على بعض الاسئلة المتعلقة بالاتجاهات الدينيه والتدخين (الأرجيلة والسجائر) بشكل عام .

تستغرق مدة الاجابة (30) دقيقة , يجوز للطلاب أو ولي امره الانسحاب من الدراسة في اي وقت , النتائج

النهائية سوف تكون متاحة للجميع من خلال الاتصال بالباحث شخصيا او بالمدرسة .

تعاونكم سيسهم بشكل فعال في انجاح هذا البحث العلمي الاسلامي مع تقديرنا لجهودكم المبدولة .

مع خالص التقدير

الباحث : طارق نايف شطناوي
رقم الهاتف : 0772207136
الابمئل: talshata@aut.ac.nz

- 1- ما الهدف من هذه الدراسة؟
 ○ فحص العلاقة بين التدخين والتدخين .
- 2- كيف تم اختياري ولماذا تمت دعوتي للمشاركة في هذا البحث؟
 ○ تم اختيار قنمه اسما المدارس من قبل وزارة التربية والتعليم ومديرية التربية والتعليم في اربد والباحث , وكان ابنكم من ضمن طلاب المدارس التي تم اختيارها لهذا البحث .
- 3- ماذا سيحدث في هذا البحث ؟
 ○ سيوفر هذا البحث اجابات هامه حول العلاقة بين الاسلام والسلوك الصحي للطلبة المسلمين في المدارس الاساسية في الاردن كما سيسهل التطبيق الصحيح للاتجاهات الدينية للحفاظ على صحة الجيل الاردني الشاب.
- 4- ما هي المخاطر والمشاق ؟
 ○ لا يوجد اي مشاق او مخاطر او ما يدعو للقلق للمشاركين حيث ان للاب والطالب الحرية التامة في اختيار مشاركتهم في البحث او عدمه , لا يستطيع احد الاطلاع على معلومات الطالب ماعدا الباحث دون استخدام اسماء الطلاب . كل اسماء الطلاب سوف تستبدل بارقام رموز خاصة للحفاظ على خصوصية الطلاب وعدم كشف هويتهم .
- 5- كيف ستحل هذه المخاطر والمشاق؟
 انظر الى الاعلى
- 6- ما هي الفوائد ؟
 ○ نستطيع جميعا (اباء , طلاب , الهيئة التدريسية والمدرسة) ان نفهم العلاقة بين التدخين والتدخين كما سيتم فحص دور التدخين في تكيف السلوك المرتبطة بالصحة .
- 7- ما هو التعويض المتوفر في حال الاصابة او الاهمال ؟
 لا يوجد
- 8- كيف سيتم المحافظة على الخصوصية؟
 ○ سيتم استبدال اسماء الطلاب برموز خاصة لعدم التعريف بهم للمحافظة على خصوصيتهم .
- 9- ما هي العواقب المترتبة على المشاركة في هذا البحث؟
 ○ ليس هناك اي تبعات حيث سوف يتم جمع المعلومات في وقت لا يتعارض مع الحصص الصفية ولن يتم اخذ وقت الحصص.
- 10- ماهي الفرص التي سأخذها بعين الاعتبار لتلبية هذه الدعوة؟
 ○ بناء صحة افضل لطلاب المدارس في الاردن وايجاد العوامل التي قد تنتج بالتدخين المستقبلي للطلاب والمساعدة في تصميم تدخل مناسب للحد من التدخين.
- 11- ماهي العملية لموافقتي باشتراك في هذا البحث؟
 ○ اقوم بتعبئة نموذج الموافقة مع توقيعني .
- 12- هل سأحصل على تغذية راجعة حول هذا البحث ؟
 ○ يمكنك الاتصال مباشره مع الباحث لتزويدك بنتائج البحث من خلال الایمیل ورقم الهاتف.
- 13- ماذا افعل اذا كانت لدي تساؤلات حول هذا البحث؟
 ○ مشاركة الطلاب ليست اجبارية , يمكن ان يختار الاب او الطالب عدم الاشتراك بالبحث نحن منقهمين ذلك كليا وليس لدينا مشكله في ذلك .يمكن ارسال التساؤلات الى مدير المدرسه او المدرس او اي من اعضاء المدرسه أو الباحث , جميع الملاحظات مرحب فيها وسوف يتم مناقشتها .
 ○ يتم اشعار مشرف البحث في البداية حول اي ملاحظه حول مجريات البحث

المشرف : الدكتور نك غريت

الايمل : nqarrett@aut.ac.nz

رقم الهاتف: 0064211073704

يجب أن يتم إخطار المخارف بشأن سير الأبحاث إلى الأمين التنفيذي للجنة اخلاقيات جامعة اوكلاند للتكنولوجيا كيت أوكونور

الايمل : ethics@aut.ac.nz

رقم الهاتف : 009649219999 رقم فرعي: 6038

14- بمن يمكنني الاتصال للحصول على معلومات إضافية حول هذا البحث ؟

- تفاصيل الاتصال مع الباحث :

الاسم : طارق نايف جبر الشطناوي

الايمل: talshata@aut.ac.nz

رقم الهاتف: 0772207136

- مشرفو البحث :

1- الدكتور نك غريت

قسم الاحصاء الحيوي وعلم الالوية / نيوزلندا / جامعة اوكلاند للتكنولوجيا

2- الدكتور نهليه الشهاب

نائب عميد كلية التمريض /جامعة العلوم والتكنولوجيا الاردنية

3- الدكتور خالد خيراالله

قسم الصحة العامة /كلية الطب / جامعة العلوم والتكنولوجيا الاردنية

بمرافقة جامعه اوكلاند للتكنولوجيا بتاريخ // الرقم المرجعي

Parent/guardian consent form

a) English version



Project title: *The Association between Religiosity and Tobacco Use among Muslim Students at Primary Schools in Irbid, Jordan*

Project Supervisor: *Dr. Nick Garrett*

Researcher: *Tariq Al-Shatanawi*

- I have read and understood the information provided about this research project in the Information Sheet dated/...../.....
- I have had an opportunity to ask questions and to have them answered.
- I understand that I may withdraw my child/children and/or myself or any information that we have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way.
- If my child/children and/or I withdraw, I understand that all relevant information including tapes and transcripts, or parts thereof, will be destroyed.
- I agree to my child/children taking part in this research
- I agree to my child/children taking part in the second stage of the research this year.
- I wish to receive a copy of the report from the research (please tick one): Yes No

Child/children's name/s :

Parent/Guardian's signature:

Parent/Guardian's name:

Parent/Guardian's Contact Details (if appropriate):

.....
.....
.....

Date:

Approved by the Auckland University of Technology Ethics Committee on type the date on which the final approval was granted AUTEK Reference number type the AUTEK reference number

Note: *The Participant should retain a copy of this form.*

b) Arabic version



نموذج موافقة الآباء / أولياء الأمور

عنوان البحث : العلاقة بين التدين والتدخين بين الطلبة المسلمين في المدارس الأساسية في اربيد, الأردن.

مشرف البحث : الدكتور بك غزيت

الباحث : طارق نايف شطناوي

- قرأت المعلومات المطروحة في ورقة التعريف عن موضوع مشروع البحث هذا بتاريخ / / وفهمتها.
- اتبعت لي فرصة طرح الأسئلة والحصول على اجاباتها.
- يحق لي ان انسحب ابني /ابنتي او أي معلومة قاموا بتقديمها قبل انتهاء جمع المعلومات دون أن أتعرض لأي ضرر.
- في حال تم سحب ابني/ابنتي ا و انا شخصيا من هذا الاستبيان فان جميع المعلومات المتعلقة بي او ابني او ابنتي سوف يتم حذفها.
- أوافق على مشاركة ابني في المرحلة الثانية من البحث هذا العام.
- أُرغب بالحصول على التقرير النهائي لهذا البحث. نعم لا

أسم الطالب :

توقيع الأب/ولي الأمر :

اسم الأب/ولي الأمر :

وسيله الاتصال مع الأب/ولي الأمر اذا أمكن

.....

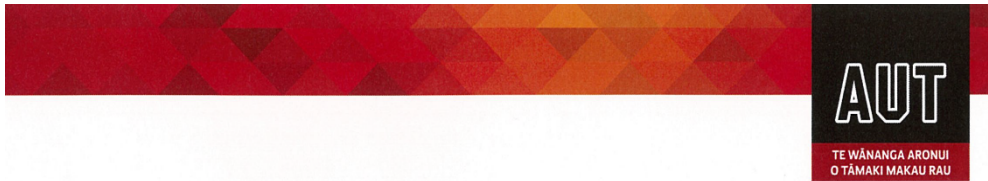
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التاريخ : / /

بوهة جسمه او كالتدخين للتكنولوجيا بتاريخ / / الرقم المرجعي

Appendix J. Research assistant confidentiality agreement



Research Assistant Confidentiality Agreement

This study, (**The Association between Religiosity and Tobacco Use among Muslim Students at Primary Schools in Irbid, Jordan**), is being supervised by (Dr Nick Garrett) at AUT University.

This study has three major objectives:

- To develop a new multidimensional measure of religiosity for Muslim School Students constructed on previous and new research and to assess its relevance, reliability and validity as a scientific tool.
- To assess the association between religiosity and tobacco use among Muslim Students at Primary Schools in Irbid in Jordan.
- To produce a complete design for an intended full study.

Data from this study will be used to develop a measurement tool for religiosity among Muslim Students at Primary Schools in Jordan. The development of this tool will provide information about the dimensions of Muslim religiosity and how they may be associated with the health behaviour such as tobacco-use. This information could then be used to develop interventions around these health behaviours. This study is also designed to obtain feasibility and design parameter estimates for the intended full study. So, Male assistant (Saif Ahmad) and female assistant (Asma Al-Mabrah) will help in data collection in schools.

Both Miss. Asma Al-Mabrah and Mr. Saif Ahmad, agree to:

1. Keep all the research information confidential by not discussing or sharing the research information in any form or format (e.g. disks, tapes, transcripts) with anyone other than the Principal Investigator(s);
2. Keep all research information in any form or format secure while it is in my possession;
3. Return all research information in any form or format to the Principal Investigator(s) when I have completed the research tasks.

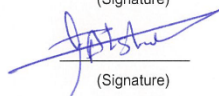
Research Assistants:

Asma Al-Mabrah
(Print name)


(Signature)

20/11/2015
(Date)

Saif Ahmad
(Print name)


(Signature)

20/11/2015
(Date)

Primary Researcher:

Tariq Al-Shatanawi
(Print name)


(Signature)

20/11/2015
(Date)

Appendix K. The names of arbitrators from Jordan

Number	Doctor's name	Academic Rank	University	Specialization (PhD) / Dept	Faculty
1	Hashem Y. Kana"An	Professor	JUST	Public health / Department of Public Health, Community Medicine, and Family Medicine	Medicine
2	Yousef S. Khader (Faculty of Applied Medical Sciences-Dean)- <i>Currently Medicine</i>	Professor	JUST	Public health (Epidemiology and Biostatistics) /Department of Public Health, Community Medicine, and Family Medicine	Medicine
3	Majed Z. Jalled	Professor	Yarmouk University	Methods of Teaching, Islamic Studies	Education
4	Abdulhakeem M. Okour (Acting chairperson of Department) Education	Associate Professor	JUST	Public health/ Department of Public Health, Community Medicine, and Family Medicine	Medicine
5	Naser Y. Magableh	Associate Professor	Yarmouk University	Dept. Educational Psychology	Education
6	Feras Al Hamouri	Associate Professor	Yarmouk University	Dept. Educational Psychology	Education
7	Emad Al Shrefen	Associate Professor	Yarmouk University	Islamic Education/ Dept. Islamic Studies	Al-Sharee'a and Islamic Studies
8	Ahmad Dia Al-Din Huseen	Associate Professor	Yarmouk University	Principals of Education/ Dept. Islamic Studies	Al-Sharee'a and Islamic Studies
9	Mohammed Al Hawari	Associate Professor	Yarmouk University	Dept. Usul Al-Din	Al-Sharee'a and Islamic Studies
10	Khalid Shouha	Associate Professor	Yarmouk University	Dept. Usul Al-Din	Al-Sharee'a and Islamic Studies
11	Zakariya S. Shatnawi	Associate Professor	Yarmouk University	Dept. Islamic Economics & Banking	Al-Sharee'a and Islamic Studies
12	Fawaz A. Momani	Assistant Professor	Yarmouk University	Dept. Educational Psychology	Education
13	Moawyah Abu Ghazal	Assistant Professor	Yarmouk University	Educational Psychology/ Development	Education
14	Ahmad A. Alshrefen	Assistant Professor	Yarmouk University	Dept. Educational Psychology	Education
15	Walied A. masadeh	Assistant Professor	Yarmouk University	Dept. Islamic Studies	Al-Sharee'a and Islamic Studies
16	Nadir Refai	Assistant Professor	Yarmouk University	Dept. Islamic Studies	Al-Sharee'a and Islamic Studies
17	Mohammad Rababah	Assistant Professor	Yarmouk University	Dept. Islamic Studies	Al-Sharee'a and Islamic Studies
18	Reem Alzoubi	Assistant Professor	Yarmouk University	Dept. Educational Psychology	Curriculum and Teaching Methods

Appendix L. Dichotomised measure

	Variables (Study measure)	Original	New binary classification (Dichotomized measure)
	live with both parents (Q5)	My Father and my Mother, My Mother only, My Father only, Other.	Yes vs No Yes=My Father and my Mother No=My Mother only, My Father only, Other.
Used at baseline and at follow-up	Daily Pocket Money (Q7)	less than quarter of dinar, Quarter dinar to less than half of dinar, Half dinar to less than 75 piasters, 75piasters to less than one dinar, One dinar and more.	< 0.50 JOD vs ≥ 0.50 JOD Less than half of dinar (< 0.50 JOD)=less than quarter of dinar, Quarter dinar to less than half of dinar. More or equal half of dinar (≥ 0.50 JOD)=Half dinar to less than 75 piasters, 75piasters to less than one dinar, One dinar and more.
	Father's education (Q8) and Mother's education (Q9)	High school or less, Diploma, Bachelor, Graduate (Master or PhD)	≤ High school vs > High school ≤ High school or less > High school=Diploma, Bachelor, Graduate (Master or PhD)
At baseline	Wealth index (Q10)	Laptop, Flat T.V, Dining room table, Internet at home, Cell phone, Microwave, A maid and Is the house rented?	Total wealth index
At follow-up			Total wealth index per units
At baseline	Parent smoke Cigarettes (74) and Parent smoke WP (Q77)	None, Both, Father only, Mother only, I do not know.	No vs Yes No=None Yes= Both, Father only, Mother only. I do not know=exclude at baseline
At follow-up			No vs Yes vs Don't know No=None Yes=Both, Father only, Mother only Add don't know
At baseline	Friend smoke Cigarettes (Q76) and Friend smoke WP (Q79)	None of them, Some of them, Most of them, All of them.	None of them vs Some of them vs Most /All of them None of them=None of them Some of them=Some of them Most /All of them=Most of them, All of them.
At follow-up			None of them vs Some of them vs Most /All of them vs Don't know None of them=None of them Some of them=Some of them Most /All of them=Most of them and All of them. Add don't know
At baseline	Anyone in house smoke cigarettes (Q75) and Anyone in house smoke WP (Q78)	Yes, No	Yes vs No
At follow-up			Yes vs No vs Don't know Add don't know
Used at baseline and at follow-up	Religiosity knowledge (Q41-Q52)	Four answer	By selecting the correct answer from a list of four alternatives were further dichotomized by correctness of answer – Yes=1 Wrong answer=No=0
Used only at follow-up	Religiosity anchor questions (Q53, Q54 and Q55)	Not religious at all, Rather not religious, Rather religious and very religious	Very religious" vs "Not very religious Very religious=very religious. Not very religious=Not religious at all, Rather not religious and Rather religious.