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Predictors of waterpipe smoking progression among youth in Irbid, Jordan: A longitudinal study (2008–2011)

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ABSTRACT

Background: The predictors of waterpipe smoking progression are yet to be examined using a longitudinal study that is guided by a theoretical model of behavioral change. This study identifies the gender-specific predictors of waterpipe smoking progression among adolescents in Irbid, Jordan.
Methods: This study uses data from a school longitudinal study of smoking behavior in Irbid, Jordan. A random sample of 19 schools was selected by probability proportionate to size. A total of 1781 seventh graders were enrolled at baseline, and completed a questionnaire annually from 2008 through 2011. Students who reported ever smoking waterpipe ($N = 864$) at any time point were assessed for progression (escalation in the frequency of waterpipe smoking) in the subsequent follow-up. Grouped-time survival analysis was used to identify the risk of progression.
Results: During the three years of follow-up, 29.6% of students progressed in waterpipe smoking. Predictors of waterpipe smoking progression were higher mother's education, enrollment in public school, frequent physical activity, and low refusal self-efficacy among boys, having ever smoked cigarettes, and having friends and siblings who smoke waterpipe among girls. Awareness of harms of waterpipe was protective among boys and seeing warning labels on the tobacco packs was protective among girls.
Conclusions: Even at this early stage, about a third of waterpipe smokers progressed in their habit during the 3 year follow up. Factors predicting progression of use differed by gender, which calls for gender-specific approaches to waterpipe interventions among Jordanian youth.

1. Introduction

Based on the Global Youth Tobacco Survey (GYTS) that was conducted between 1999 and 2007, and involved more than 90,000 children (13–15 years) in the Eastern Mediterranean Region (EMR), the prevalence of waterpipe smoking has become higher than cigarette smoking among youth in this region (El-Awa et al., 2010; Warren et al., 2006; Maziak et al., 2014). Nevertheless, most national and international tobacco control strategies are not specifically addressing this method of tobacco use (Maziak, 2011). This may be partly attributed to the dearth of evidence on specific determinants of initiation and progression of waterpipe smoking.

Evidence from studying cigarette smoking trajectories showed that 25% of experimenters will continue smoking later in their life (Karp et al., 2005; Mayhew et al., 2000). Like cigarettes, it is necessary to know the percentage of waterpipe experimenters who will continue to smoke waterpipe. Additionally, understanding the factors that distinguish adolescents who progress in waterpipe smoking beyond the experimentation stage is crucial for early intervention before the development of nicotine dependence that is manifested by the increased frequency of waterpipe use (Salameh et al., 2008), or the onset of cigarette smoking (Jaber et al., 2015; McKelvey et al., 2014).

Longitudinal studies in developed nations have identified the individual and social predictors that are associated with cigarette smoking trajectories (Mayhew et al., 2000). However, findings from these studies may not be applicable to waterpipe smoking that

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has unique social use patterns, cues, perceptions of harm, and societal/familial tolerance, particularly among girls (Amin et al., 2012; Maziak et al., 2005). Moreover, findings from studies among youth in developed nations may not be generalizable to youth in the EMR who have different knowledge, beliefs, and attitudes towards tobacco smoking (Asfar et al., 2005; Islam and Johnson, 2005; Maziak et al., 2004a,b).

Like cigarettes, waterpipe smoking requires longitudinal studies to identify the determinants of progression among youth. This is the first longitudinal study that is specifically addressing waterpipe smoking progression among youth in Jordan. Guided by a broad theoretical framework of behavioral change (attitude, social influence, and self-efficacy model [ASE; De Vries et al., 2003), this study aimed to compare the hazard of progression in waterpipe smoking between levels of potential determinants, among a school-based sample of adolescents (mean age = 12.8 years old at baseline) who reported ever smoking waterpipe in Irbid, Jordan.

2. Methods

2.1. Study participants

This study used data from the Irbid longitudinal study of smoking behavior (ILS). Detailed methods were published elsewhere (Mzayek et al., 2011, 2012). Briefly, all schools in Irbid city ($N = 60$) were stratified by gender (male, female, and mixed) and type (public and private). A random sample of 19 schools was selected with probability proportional to size. All seventh grade students at the selected schools were invited to participate in the study. A total of 1781 (94.9%) students enrolled at baseline by turning in assent and their parents' consent forms. The students were surveyed annually from 2008 through 2011 (4 data collection waves including the baseline). For the purpose of this study, only students who reported ever smoking waterpipe at any point of data collection were included in the analysis. Non-smokers who reported smoking waterpipe daily the first time they reported waterpipe smoking were considered progressed, and therefore were excluded from the analysis. The final sample included 864 students with at least two consecutive waves (see Fig. 1 for details about participants' selection).

2.2. Procedures

Data were collected using a pilot-tested questionnaire developed in accordance with international guidelines (World Health Organization, 1998), using instruments that were tested and validated in Arabic such as the Global Youth Tobacco Survey (Global Youth Tobacco Survey Collaborative Group, 2002). The questionnaire was composed of four sections: socio-demographic status, cigarette smoking, waterpipe smoking, and other factors such as students' beliefs and exposure to tobacco advertisements.

Using the same items, the self-administered questionnaire was completed annually in the classrooms and facilitated by well-trained study personnel who explained the purpose of the study and responded to the students' questions. To improve the validity of the students' responses, no parents or school personnel were allowed in the classroom during data collection. This study was approved by the Institutional Review Boards (IRBs) of Jordan University for Science and Technology, University of Memphis, Syrian Society against Cancer, and Florida International University.

2.3. Measures

At each wave, students were asked, "How many times did you smoke waterpipe in the past month (30 days)." The responses were as follows: 0 = not at all, 1 = once weekly, 2 = more than once weekly but not daily, and 3 = daily. The participant was coded as having progressed if he/she reported a higher frequency of waterpipe smoking compared with that reported at baseline, or from that reported for the first time among never smokers who initiated waterpipe smoking subsequently. Guided by the ASE model (De Vries et al., 2003), we included a wide range of individual and social factors as potential predictors of waterpipe smoking progression.

2.4. Statistical analysis

Life tables were used to estimate the hazard probabilities of waterpipe smoking progression associated with each time interval by gender. The hazard of waterpipe smoking progression was estimated for each potential predictor using dichotomous grouped-time survival analyses (Allison, 1995; D'Agostino et al., 1990;

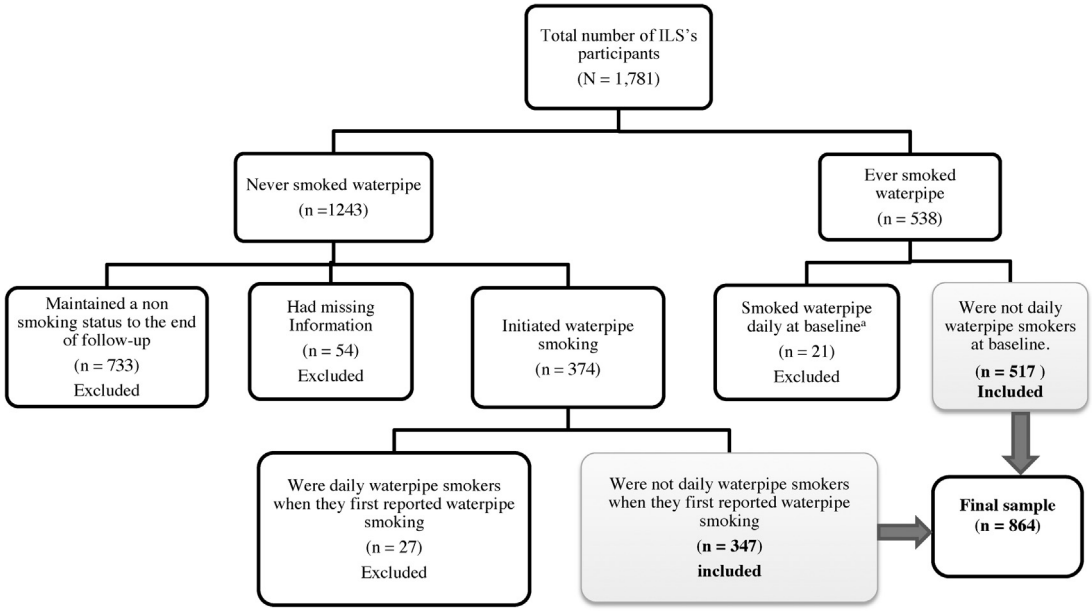

Fig. 1. Participant's selection from Irbid longitudinal study of smoking behavior (ILS) to examine the predictors of waterpipe smoking progression among school adolescents in Jordan (2008–2011).