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The interrelationship between smoking and depression in Indonesia

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KEYWORDS
Smoking;
Depression;
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Abstract
Objective: This study aims to examine the reciprocal relationship between smoking and depression in Indonesia using simultaneous equation modeling.
Methods: Simultaneous equation modeling is conducted using the 2007 Indonesian Family Life Survey.
Results: Findings from the simultaneous equation modeling suggest that depression and smoking commonly co-occur together among Indonesian men and women.
Conclusion: To mitigate the negative consequences of cigarette consumption and depression, there remains a pressing need for an integrated treatment of both smoking and depression that simultaneously treat these two disorders. The fact that the effect of depression on smoking is greater among Indonesian women also suggests that the use of gender-specific intervention is warranted.

Introduction

For several decades, it is well-established in both clinical and non-clinical studies that smoking and depression are closely linked and frequently occur simultaneously within the same individual [20]. Several previous epidemiologic studies have demonstrated an association between smoking and depression [2,5-7,9-14,17,20-21,23,26,29]. A higher volume of smoking is associated with higher levels of depressive symptoms [7,9]. The potential importance of smoking in alleviating feelings of depression has also been highlighted [17].

However, most researchers have either focused on the unidirectional relationship between smoking and depression or the prevalence of the two conditions. This lack of previous studies that focus on the reciprocal relationship between smoking and depression is surprising because there are several reasons to expect that smoking and depression go hand in hand, each having the capacity to serve as a causal stimulus in the development of the other.

Even though research on the interrelationship between smoking and depression has burgeoned in developed countries,

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no previous published work in Indonesia has examined the specificity of depression's association with smoking. To fill this research gap, using simultaneous equation modeling, this study aims to extend the previous research to examine the reciprocal relationship between smoking and depression using the 2007 Indonesian Family Life Survey.

Theoretical perspectives

Previous researchers have identified two theoretical debates (self-medication and intoxication) to explain the interrelationship between smoking and depression. Each of these theories assigns different logics to the interrelationship between smoking and depression and therefore has different policy implications.

According to the self-medication hypothesis, cigarette consumption as a form of self-medication because cigarette smoke may act pharmacologically in the brain similar to those of antidepressant drugs [11]. This hypothesis posits that depression can directly promote and exacerbate smoking because depressed individuals are more likely to smoke as a means to alleviate aversive depressive symptoms such as anxiety, depression, and other forms of psychological distress [9].

In contrast to the self-medication hypothesis, the *intoxication hypothesis* states that cigarette consumption contributes to the development and precipitation of depression because of the existence of a direct biological link between nicotine withdrawal and depression [27,28]. As a stimulant drug, nicotine soothes the limbic system and chronic nicotine infusion reduces the synthesis of 5HTT protein [28]. Thus smoking not only helps one to relax but also stimulates and increases concentration. This explains why depression may be exacerbated following smoking cessation because the body needs a certain level of nicotine to function when it has gotten use to the drug [27].

Materials and methods

Study population

The empirical work of the study is based on the fourth wave of the Indonesian Family and Life Survey (IFLS) conducted in 2007. The Indonesian Family Life Survey (IFLS) is a collaborative effort between RAND, the center for Population and Policy Studies (CPPS) of the University of Gadjah Mada and SurveyMETRE (Survey Measurement Training Research). It is an on-going longitudinal survey in Indonesia. It was designed between February and September 2007 and funded by grants from the National Institute on Aging (NIA), the National Institute for Child Health and Human Development (NICHD), and the World Bank.

In the first wave of data (IFLS1), 7224 households were interviewed, and detailed individual-level data were collected from over 22,000 individuals. The second, third, and fourth waves of the study were fielded in 1997–1998, 2000, and 2007–2008. The re-interview rates of IFLS1 households were about 94 percent, 95 percent, and 90 percent in ILFS2, IFLS3, and IFLS4 respectively. IFLS4 offers several strengths for the purposes of an analytical framework. In addition to collecting current information on most topics and a high re-interview rate, individuals were interviewed in-depth about their life histories on a number of life course domains, including migration, marriage, contraceptive use, childbearing patterns, occupational and job changes, educational attainment, health behaviors, health conditions and so forth.

This study used data from Indonesian men and women (aged 15 and up at the time of the survey) who participated in the surveys on smoking and depression (9986 and 3735 respectively). The analysis is limited to individuals whose information on cigarette consumption, smoking duration, number of comorbid conditions, depression, education, gender, age, marital status, and physical limitation is available. The final analysis sample consists of 3061 individuals (1494 women; 1567 men). Only coefficients with $p<=0.05$ are regarded as significant.

Study design

The Indonesian Family Life Survey (IFLS) uses a three-stage sampling procedure to ensure a nationally representative sample of the Indonesian population. Prior to sampling, provinces in the sampling frame – a comprehensive national list of all provinces were assigned to 26 predetermined strata. At the first sampling stage, 13 provinces were randomly selected out of the 26 provinces. 83 percent of the Indonesian population was included in those 13 provinces. At the second sampling stage, enumeration areas (EAs) were randomly selected within each of the 13 provinces. A total of 321 enumeration areas were randomly from the 13 provinces. EAs located in urban areas and smaller provinces were oversampled to facilitate urban-rural and Javanese—non-Javanese comparisons. At the final sampling stage, households were randomly selected within each EA. Since IFLS is an on-going longitudinal survey, the sampling scheme for the first wave is used as the bases for the subsequent waves of the survey.

Measures

Endogenous variables

A respondent is classified as a moderate or heavy smoker if he/she smokes more than 15 cigarettes a day [25]. A respondent is classified as a light smoker if he/she smokes one to 14 cigarettes a day [25]. A respondent is classified as non-smoker if he/she does not smoke cigarettes or consume any tobacco products. Depression is assessed by the survey question: "Overall in the last 30 days, how much of a problem did you have with feeling sad, low, or depressed?" For each statement, individuals responded on a five-point scale from 1=none, 2=mild, 3=moderate, 4=severe, and 5=extreme/cannot do. This item was coded into a four-point scale from 1=none, 2=mild, 3=moderate, 4=severe/extreme/cannot do.

Exogenous variables

Gender is formulated as a dichotomy for males (reference) and females. Education is indicated by dummy variables for up to primary education, secondary education, and college or university. Physical limitation is assessed by the survey question: "Overall in the last 30 days, how much of a problem did