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Estimates of peer effects in adolescent smoking across twenty six European Countries

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ABSTRACT

Although it is widely believed that one of the key factors influencing whether an adolescent smokes or not is the smoking behaviour of his or her peers, empirical evidence on the magnitude of such peer effects, and even on their existence, is mixed. This existing evidence comes from a range of studies using a variety of country-specific data sources and a variety of identification strategies. This paper exploits a rich source of individual level, school-based, survey data on adolescent substance use *across* countries – the 2007 European Schools Survey Project on Alcohol and Other Drugs – to provide estimates of peer effects between classmates in adolescent smoking for 75,000 individuals across 26 European countries, using the same methods in each case. The results suggest statistically significant peer effects in almost all cases. These peer effects estimates are large: on average across countries, the probability that a 'typical' adolescent smokes increases by between .31 and .38 percentage points for a one percentage point increase in the proportion of classmates that smoke. Further, estimated peer effects in adolescent smoking are stronger intra-gender than inter-gender. They also vary across countries: in Belgium, for example, a one percentage point increase in reference group smoking is associated with a .16 to .27 percentage point increase in own smoking probability; in the Netherlands the corresponding increase is between .42 and .59 percentage points.

Introduction

Tobacco smoking is the largest single cause of avoidable death in the EU, with 650,000 smoking-related deaths each year, many of which occur at well below average life expectancy (European Commission, 2010). Globally, almost five million premature deaths in the year 2000 were linked to smoking (Ezzati & Lopez, 2003). Most smokers begin to smoke in adolescence, with adolescent smoking a very strong predictor of later smoking (e.g. Merline, O'Malley, Schulenberg, Bachman, & Johnston, 2004; Pierce & Gilpin, 1996). One way for policy makers to reduce the number of smoking-related deaths in the future – and also to improve adolescent health in the shorter term – is therefore to reduce the prevalence of smoking among adolescents now. Research that improves our understanding of why adolescents smoke can help effective policy design in this critical area.

Although it is widely believed that one of the key factors influencing whether an adolescent smokes or not is the smoking behaviour of his or her peers (e.g. Gibbons, Helweg-Larsen, & Gerrard, 1995), empirical evidence on the magnitude of such peer effects, and even on the existence of such peer effects, is mixed. Eisenberg (2004, p1) puts it as follows: *"For adolescents in particular, it is almost accepted as fact that peers exert strong effects on each other's substance use behaviour. Yet in practice it is extremely difficult to perform an empirical test that verifies these effects."* The difficulty arises from a combination of data requirements – at the very least information is required on own behaviour and reference group behaviour – and problems separating out the impact of peer behaviour on own behaviour (endogenous social interactions effects) from the impact of peer characteristics (contextual effects) and/or correlated unobserved factors (correlated effects) on own behaviour (see Brock & Durlauf, 2001; Manski, 1993). Nevertheless, a number of studies do provide estimates of peer behaviour effects in adolescent smoking, for a variety of reference groups, using a variety of data sources, and using a variety of econometric methods to tackle the identification problem. The school, school grade or school class is commonly taken as the reference group, and estimates following this approach range from zero peer effects to large, positive peer effects. Powell, John, and Hana (2005), for example, find that a one percentage point increase in smoking prevalence among peers is associated with a more than half percentage point increase in the probability of an individual in the class smoking. Other studies treat friends or closest friends as the

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relevant reference group, with those exploiting network data where friendship links are explicitly observed, usually within school-based surveys, among the most informative (e.g. Clark & Loheac, 2007; Ennett et al., 2006).

One thing all these studies have in common is that they are all based on single country – often US – data sets. The extent to which estimates of peer effects for adolescents in one country can be generalised to other countries, however, is not clear. For example, Gibbons et al. (1995) suggest that cultural differences between the US and Denmark might affect the degree to which adolescent smoking behaviour is influenced by peers. So where one study for the Netherlands finds zero peer effects (Soetevent & Kooreman, 2007) but another for the US finds large, positive peer effects (Gaviria & Raphael, 2001), to what extent does this reflect differences in methods and to what extent does this reflect actual differences in peer effects across countries?

This paper exploits a rich source of individual level, school-based, survey data on adolescent substance use across countries – the 2007 European Schools Survey Project on Alcohol and Other Drugs (ESPAD) – to provide estimates of peer effects in adolescent smoking among classmates across 26 European countries. Although such cross-country data sources have been around for some time – see also Currie et al. (2008) for information on the World Health Organisation's Health Behaviour in School-aged Children study (HBSC) – this is the first paper to use cross-country data to explore the extent to which estimates of peer effects in adolescent smoking can be generalised across countries. Crucial to this is the common methodology used to collect the ESPAD data across countries, and the common methodology – the same definition of the reference group (the school class), the same definitions of own and peer smoking behaviour, the same set of control variables, the same econometric approach (probit and instrumental variables (IV) probit) – used here for estimating peer effects across countries. The paper addresses the following research questions: (i) Do peer effects in adolescent smoking exist in all 26 countries? (ii) Does the magnitude of estimated peer effects vary across countries?

Existing literature

Peer effects (or social interactions) are the subject of a huge body of theoretical and empirical research across the social science disciplines (see Ioannides (2008) and Scheinkman (2008) for recent and concise reviews). This paper, however, is more narrowly focussed on estimating peer behaviour effects – endogenous social interactions – between classmates or schoolmates in adolescent smoking. Although no study has previously provided estimates of such peer effects across countries using a common data set and common methodology, several existing studies provide estimates *within* countries. Each of these studies examines the impact of smoking prevalence amongst classmates or schoolmates on the smoking participation of the individual, in most cases expressed as whether the individual has smoked at least one cigarette in the last 30 days. Despite their similarities, however, the studies draw mixed conclusions on the magnitude and even the existence of peer effects in teenage smoking.

First consider recent studies using US data. Gaviria and Raphael (2001) examine peer effects in smoking using a cross-section of 12,000 individuals across 900 schools taken from the 1990 National Educational Longitudinal Survey. They provide single equation linear probability model estimates (treating peer smoking as exogenous) and two stage least squares (2SLS) estimates (treating peer effects as endogenous), where peer smoking is instrumented by various peer family background factors including measures of parental education and a single-parent household indicator. They find significant peer effects using both methods, very similar in magnitude, with a one percentage point increase in peer smoking prevalence associated with a one sixth percentage point increase in the probability of the individual smoking. Powell et al. (2005) used 1996 Audits and Surveys cross-sectional data on 12,000 individuals across 200 schools to examine peer effects from schoolmates, again using both a single equation approach (a probit model) and an IV approach with peer smoking instrumented by similar peer family background factors. They too find significant peer effects using both methods, with the IV and single equation estimates again similar in magnitude, but with a substantially larger magnitude in both cases – an elasticity of just over one half – than Gaviria and Raphael (2001). In contrast, Eisenberg (2004) uses National Longitudinal Survey of Adolescent Health (Add Health) data on 10,000 individuals across more than 100 schools, and National Educational Longitudinal Survey data on 25,000 individuals across 1000 schools, and a variety of methods, to estimate peer effects for adolescent smoking. He presents a range of estimates, but finds no significant peer effects where the school is treated as the relevant reference group and the school grade structure is used to instrument for peer behaviour. Clark and Loheac (2007) exploit the longitudinal structure of the Add Health data to replace contemporaneous peer smoking with lagged peer smoking on the right hand side of the regression, as an alternative to the IV approach of earlier studies. They too find no significant peer effects in smoking, at least when school dummies are included in the model. Fletcher (2010) uses Add Health data with IV and school dummies, treating school grade as the relevant reference group, and in contrast to Clark and Loheac (2007) does find evidence for peer effects in smoking, with a magnitude in between that suggested by Gaviria and Raphael (2001) and Powell et al. (2005).

Outside of the US, Soetevent and Kooreman (2007) provide estimates of peer effects in smoking using the 2000 Dutch National School Youth Survey data on a cross-section of 7500 individuals across 485 classes in 70 schools in the Netherlands, treating the class as the reference group. Using a probit model with school dummies they find no evidence of peer effects. Lundborg (2006) presents evidence of peer effects in smoking using a 2000/01 cross-section of 2640 Swedish school children aged 12–18, treating the school class as the reference group. Using an IV probit model with school dummies they find evidence of large, positive peer effects, similar in magnitude to those found by Powell et al. (2005) for the US. McVicar and Polanski (2010) use an earlier wave of the ESPAD survey for the UK, with 2000 individuals across 80 schools, and find significant peer effects from classmates with an elasticity of between one third and one half, again using peer family background variables as instruments for peer smoking in the manner of the earlier US studies. There are of course other studies not mentioned here, but even this brief review is sufficient to illustrate the lack of consensus in the empirical literature.

The data: ESPAD 2007

The data used here are drawn from the ESPAD 2007 Survey (for more details see Hibell et al., 2009). The ESPAD 2007 Survey is an international collaboration across 35 European countries (with five more added in 2008) collecting cross-sectional information on substance use, including smoking, of children aged 15–16 years. The 2007 sweep follows earlier and smaller sweeps in 1995, 1999 and 2003. The ESPAD uses common sampling frames, methods and questionnaires across countries, resulting in survey data that is highly comparable across countries. Each country randomly selected a representative sample of schools, in most cases with pupils in a single class asked to complete the ESPAD questionnaire, anonymously, during school hours, and under exam conditions. (Around one in six schools provided data on more than one class,