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Short report

Social capital and adolescent smoking in schools and communities: A cross-classified multilevel analysis

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ABSTRACT

We sought to determine whether social capital at the individual-, school- and community-level can explain variance in adolescent smoking and accounts for social inequalities in smoking. We collected data as part of the 2005/6 Health Behavior in School-aged Children survey, a nationally representative survey of the health and well-being of high school pupils in Belgium (Flanders). Social capital was assessed by structural and cognitive components of family social capital, a four-factor school social capital scale and a cognitive community social capital scale. We fitted non-hierarchical multilevel models to the data, with 8453 adolescents nested within a cross-classification of 167 schools and 570 communities. Significant variation in adolescent regular smoking was found between schools, but not between communities. Only structural family social capital and cognitive school social capital variables negatively related to regular smoking. No interactions between socio-economic status and social capital variables were found. Our findings suggest that previously observed community-level associations with adolescent smoking may be a consequence of unmeasured confounding. Distinguishing nested contexts of social capital is important because their associations with smoking differ.

1. Introduction

Tobacco smoking, the largest single cause of avoidable death in the EU (European Commission, 2013), inversely relates to socio-economic status in adult (Winkleby et al., 1992) and adolescent populations (Blane et al., 1996). Prevention interventions are needed at an early stage because such health-risk behaviors are typically established during adolescence and young adulthood (Centers for Disease Control and Prevention, 2008). The last twenty years have witnessed an explosion of interest in place effects on health (Diez Roux, 1998; Macintyre et al., 2002). This research has found between-school and between-neighborhood variance in adolescent smoking (Aveyard et al., 2005; Henderson et al., 2008; Kelly et al., 2011; Lovato et al., 2010). However, differences in the associations of social contextual factors with the prevalence of smoking remain unclear (Galea et al., 2004). The goal of this study was to explore the social context of adolescent smoking.

The association between social capital and adult smoking is well documented (Chuang and Chuang, 2008) including the "miniaturization of community" phenomenon (Lindstrom, 2003), but evidence in adolescent populations remains sparse. Few studies have examined a link between both individual- (Curran, 2007; Lundborg, 2005; Morgan and Haglund, 2009) or contextual social capital (Aslund and Nilsson, 2013; Henderson et al., 2008; Takakura, 2011; Thorlindsson et al., 2012) and adolescent smoking, and more specifically in the context of families (Curran, 2007), schools (Henderson et al., 2008; Takakura, 2011), and communities (Aslund and Nilsson, 2013; Thorlindsson et al., 2012). The definition and measurement of social capital are important to understand (a) the heterogeneous findings across studies, and (b) the differential impact of various components of social capital on health. Social capital has been broadly defined as the resources that individuals access through their social networks (Kawachi and Berkman, 2001). A first distinction in the conceptualization and measurement of social capital is commonly drawn between "structural" and "cognitive" components of social capital (Harpham et al., 2002). The structural component reflects behavioral manifestations of network connections: *network social capital* refers to network

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membership, *family social capital* refers to parent–child and parent–school interactions, *school social capital* consists of child–school interactions, and child–neighborhood interactions are labeled as *community social capital*. Within these networks lie subjective aspects of social capital, such as perceptions of trust and reciprocity. These subjective elements of social capital are referred to as cognitive components. Almost orthogonal to the distinction between structural and cognitive social capital, most conceptualizations can be decomposed into "horizontal" and "vertical" components (Islam et al., 2006). Horizontal social capital reflects ties that exist among individuals or groups of equals or near-equals, and vertical (linking) social capital refers to interactions across explicit, formal or institutionalized power or authority gradients in society such as relationships between pupils and teachers (Szreter and Woolcock, 2004). Additional distinctions have been drawn within horizontal social capital, namely "bonding" social capital (strong ties within homogenous groups such as family members and friends) and "bridging" social capital (weaker ties within heterogeneous groups such as neighbors and school personnel, and formal or informal social participation) (Putnam, 2000). A third distinction concerns the level of analysis – whether social capital is treated as an individual attribute or as a collective resource (Kawachi, 2006). The proliferation of multilevel techniques in public health research is consistent with the notion that social capital influences health across multiple nested contexts (Duncan et al., 1996, 1998). Smoking among adolescents, for instance, might not only be shaped by where they live, but also be an interface of simultaneous influences of the family, school, and community contexts (De Clercq et al., 2012; Morrow, 1999). A limitation of traditional multilevel models is the requirement that pupils are nested within schools, and schools in their turn, are nested within communities. This rigid classification rarely corresponds to actual populations, in which pupils from several neighborhoods attend the same school or schools serve multiple communities. Ignoring the cross-classification within a population causes underestimation of the standard error of estimates. To our knowledge, no previous research has examined the multilevel association between multiple levels of social capital and smoking allowing for a non-nested data structure.

Influenced by theory on income inequality and social network integration (Wilkinson, 1996), prior research has proposed the concept of social capital as an explanatory pathway in social inequalities in adult (Kawachi et al., 1997) and adolescent (Waterson et al., 2004) health. Regarding inequalities in adolescent smoking, only two studies have examined the role of individual (Evans and Kutcher, 2011) and contextual (Thorlindsson et al., 2012) social capital. These studies found that community social capital buffered the negative relation between socio-economic status and smoking. Previous research also found that high levels of neighborhood or community social capital might weaken (flatten) the social gradient in adolescent health (Aminzadeh et al., 2013; De Clercq et al., 2012; Vyncke et al., 2013).

The objectives of this study were to (1) estimate the amount of variance in adolescent smoking that can be attributed to individual-, school- and community-level factors, (2) evaluate the importance of social capital at the individual-, school- and community-level for explaining variance in smoking, and (3) investigate whether differences in individual-, school- or community-level social capital account for social inequalities in adolescent smoking.

2. Methods

2.1. Study participants

The sample consisted of 8453 adolescents nested within a cross-classification of 167 schools and 570 communities (postal code areas). The data were collected in the Flemish 2005–2006 Health Behavior in School-aged Children (HBSC) survey. Self-completion questionnaires were administered in school classrooms with requirements in terms of sampling, questionnaire items and survey administration being set out in a standardized research protocol (for more details of the international used methodology and survey design, see Currie et al. (2009) and Roberts et al. (2007)). In Flanders, pupils from the 1st year (12 year) to the 6th year (18 year) secondary school were questioned. A random sample of schools was drawn from the official school list of Flanders, keeping into account the size of the school (schools were weighted by the number of pupils in the school so that every pupil has the same chance to be in the sample). In total 336 schools were asked to participate and 167 agreed (49.7%). Within the schools, 2–3 classes were selected to participate keeping into account the distribution of gender and the different educational levels in Flanders (general, technical and vocational). The response on pupil level was 98.2%. Passive informed consent was asked to the parents. The study was approved by the ethics review committee of the University Hospital of Ghent (project EC UZG2005/383).

2.2. Measures

2.2.1. Smoking

Smoking frequency was measured with the following question: "How often do you smoke tobacco at present?" (1 = every day, 2 = at least once a week but not every day, 3 = less than once a week, 4 = never). Adolescents who smoked at least once a week were considered regular smokers (Richter and Leppin, 2007).

2.2.2. Parental and peer smoking

Many studies show that parental smoking and peer smoking are important predictors of adolescent smoking (Kelly et al., 2011). This was measured with the following question: "Does one of the following people smoke?", with separate response options for father, mother, and best friend (1 = every day, 2 = occasionally, 3 = never, 4 = don't know, 5 = don't have or see this person). Persons who smoked at least occasionally were considered as smokers.

2.2.3. Socio-economic covariates

The Family Affluence Scale (FAS) is a composite indicator of self-reported socio-economic status comprising four items that address family assets or conditions that indicate material wealth (Currie et al., 2008): 'Does your family own a car, van or truck? (0 = no; 1 = yes one; 2 = yes two or more); Do you have your own bedroom for yourself? (0 = no; 1 = yes); During the past 12 months, how many times did you travel away on holiday with your family? (0 = not at all, 1 = once, 2 = twice, 3 = more than twice); How many computers does your family own?' (0 = none, 1 = one, 2 = two, 3 = more than two). Responses are summed on a 1 to 10 scale with higher scores indicating greater affluence. In addition, adolescents' current education was also used as an indicator of socio-economic status (coded as 1 = general, 2 = technical, 3 = vocational) (Richter and Leppin, 2007).

2.2.4. Structural social capital

Network social capital was measured by participation in clubs or organizations: "Are you involved in any of these kinds of clubs or organizations?" A sum score was calculated from the following response categories: sports club, voluntary service, political organization, cultural organization, religious group, youth club, other club (0 = no, 1 = yes) (De Clercq et al., 2012). Family social capital was measured with two separate questions: "How often do you have breakfast with your mother or father?"; "How often do you