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The effect of peers on HIV infection expectations among Malawian adolescents: Using an instrumental variables/school fixed effect approach

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ABSTRACT

Malawian adolescents overestimate their HIV infection risk. Understanding why they do so is important since such overestimation is likely to be linked to later-life outcomes. This study focuses on the influence peers have on HIV infection expectations. I use novel school-based survey data collected in Malawi between October 2011 and March 2012 (n = 7910), which has more reliable measures of peers' HIV infection expectations than other studies. I employ a combined instrumental variables/fixed effects methodology designed to addresses several methodological challenges in estimating peer effects, including self-selection of friends, the issue of unobserved environmental confounders, and the bi-directionality of peer effects. Several tests are conducted in order to assess the robustness of the specifications. Results suggest that a one-percentage-point increase in the mean probabilistic expectation of HIV infection among peers increases an adolescent's own subjective expectation of infection by an average of 0.65 percentage points. This paper shows that peer influence is greater for males than for females. Results also suggest that the peer effects on HIV infection expectations are only statistically significant among those lacking more complete knowledge of HIV/AIDS.

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1. Introduction

Adolescents' risk perceptions are found to be less accurate than adults, especially when it comes to mortality expectations (Fischhoff et al., 2000; Millstein and Halpern-Felsher, 2002). For example, adolescents in the U.S. tend to have unrealistically high expectations of early death (Jamieson and Romer, 2008). Similarly, Malawian adolescents clearly overestimate their risk of HIV infection (Anglewicz and Kohler, 2009). In the sample used for this study (7910 secondary school students with an average age of 16), the reported mean subjective probability of having HIV is 16%, while in reality, the HIV prevalence rate among Malawian adolescents aged 15–19 is only 2.7% (National Statistical Office, 2011). These high HIV infection expectations are especially surprising considering that many adolescents are sexually inexperienced: among those aged 19–24 with more than secondary education, 12.6% of women and 35.2% of men initiated sexual activity before age 18 (National Statistical Office, 2011).

Social scientists and medical researchers have long been interested in discovering what determines individual perceptions of health risk, particularly because those perceptions are important prerequisites for behavior change in health behavior models (e.g., Ajzen and Fishbein, 1980). In the area of health and HIV/AIDS research, a number of factors have been shown to be associated with an individual's HIV risk perception, including some demographic characteristics, schooling, past sexual practices, self-efficacy, living with chronically ill family members, and so on (Barden-O'Fallon et al., 2004; Macintyre et al., 2004; Prohaska et al., 1990). Another line of recent research has suggested that communication and interactions with network partners such as relatives, friends, and acquaintances are important determinants of individuals' perceptions of HIV infection risk. For example, studies find that individuals who have network partners with high perceived risk of contracting HIV are themselves more likely to worry about contracting HIV (Bühler and Kohler, 2003; Smith and Watkins, 2005; Smith, 2003). However, these studies contain an important caveat that the findings may not be interpreted as causal. More specifically, these studies fail to account for the selection of individual's network partners, by making the assumption that one's network is randomly formed, which does not reflect reality.

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However, two studies account for social network endogeneity (i.e., the non-random selection of individuals into their networks) by using individual fixed effects and instrumental variables strategies. Similar to the evidence from other studies, they find that in Malawi and Kenya, network partners' risk perceptions of contracting HIV have an impact on individuals' own perceptions, even after accounting for selection into individual's social networks (Helleringer and Kohler, 2005; Kohler et al., 2007).

However, the findings from these previous studies are prone to measurement biases. They use the respondent's *perceptions* of network partners' HIV infection expectations, not network partners' *actual* reports of such expectations. The relevant social psychological bias includes projection bias, also known as the false consensus effect (Ross et al., 1977). Projection bias occurs when an individual "projects" his or her own beliefs and behaviors onto others, unconsciously assuming that most people think and behave like him or her. So, individuals may report their own HIV infection expectations twice: once for individual expectations and once for network partners' expectations. This would clearly inflate estimates of the effect that peers' expectations have on individual expectations.

In addition, to my knowledge, there exists no research that has focused on the role of social interactions and networks in the transmission of HIV infection expectations among adolescents. As described above, given that many adolescents in sub-Saharan Africa remain sexually inexperienced during adolescence and HIV prevalence among adolescents are substantially lower than adults, the way in which adolescents construct their own HIV risk perceptions may be different from adults. For example, having little or no past sexual experience to base their HIV infection expectations on, adolescents may rely more heavily on external sources of information. In particular, peers often serve as the most critical source of information and influence, as adolescents grow independent from parents and spend an increasing amount of time with peers (Giordano, 2003). Moreover, since uncertainty and anxiety about the future (e.g., unrealistic fatalism and uncertainty about HIV status) among adolescents are shown to have long-term detrimental effects on educational attainment, health, and fertility decisions (Duke et al., 2002; Nguyen et al., 2012; Trinitapoli and Yeatman, 2011), understanding critical determinants of HIV infection risk overestimation among adolescents is crucial for guiding policies to foster human capital accumulation and improve health in sub-Saharan Africa.

In this study, I aim to establish credible evidence of peer influence on HIV risk expectations by separating selection and confounding effects from peer influence effects using a quasi-experimental framework. Moreover, in order to avoid potential biases resulting from using respondents' *perceptions* of network partners' HIV infection expectations that previous studies use, I use expectations reported directly by peers. Although no existing research reveals gender heterogeneity in the effects of network partners' HIV risk perceptions, given substantial gender differences in friendship formation and social interactions among adolescents (Crosnoe, 2000; Maccoby, 1990; Moore, 1990), I investigate whether peer effects in HIV risk perceptions vary by gender. Finally, adolescents who have appropriate knowledge of HIV/AIDS may be less reliant on peers' HIV infection expectations than those with less knowledge, so I stratify the results based on level of knowledge about HIV/AIDS.

1.1. Conceptualizing and estimating peer effects

Manski (1993) distinguishes among the following three types of social effects: endogenous effects, contextual effects, and correlated effects. Endogenous effects occur when an individual's propensity to behave in some way varies with the behavior of the reference group. In the case of adolescents' HIV infection expectations, endogenous effects can occur if an individual is likely to have a higher expectation of HIV infection if his peers also have high expectations—that is, if their expectations are interdependent. Contextual effects (or exogenous effects) occur when an individual's propensity to behave in some way varies according to the exogenous characteristics of the reference group. Lastly, correlated effects occur when individuals in the same group tend to behave similarly because they have similar individual characteristics or face similar institutional environments. For example, a similar level of HIV infection expectation among students attending the same school may be due to their exposure to a shared school environment (e.g., HIV/AIDS education).

Among these categories of peer effects, this study focuses on identifying endogenous peer effects because they entail potential social multiplier effects (or spillover effects), which occur when policy and other interventions are multiplied through social interactions. While empirically isolating endogenous peer effects from contextual and correlated effects is crucial for obtaining more credible estimates of peer influence, there are several critical challenges. First, peer groups (assumed to be classmates in this paper) can be endogenously determined by parental choices (e.g., residential choices, private school enrollment), such that estimated peer effects may be attributable to the similarity among individuals rather than peer influences. Second, potential unobserved environmental characteristics that influence individual and peer group choices simultaneously (i.e., correlated effects) may confound the peer effect, leading to biased estimates of the peer effects. A third empirical challenge is separately examining bi-directional effects in social relationships. Since peer behavior affects individual-level behavior and vice versa, a standard linear empirical model of social interactions using an average measure of behavior by a reference group suffers from identification problems (termed the "reflection problem" by Manski (1993)).

In order to address these methodological challenges and accurately quantify endogenous peer effects, this paper uses an instrumental variables/fixed effects methodology. First, I employ an instrumental variable strategy to overcome the identification problem caused by the simultaneity of group- and individual-level decisions. The validity of the instrumental variable strategy in this study critically depends on school fixed effects. School-level fixed effects will control for the main source of selection into schools, such that the instrument variable would be uncorrelated with school-level characteristics. Additionally, controlling for school-level fixed effects eliminates unobserved school-level factors that are shared by all individuals within the same school, thus minimizing correlated effects. In order to assess the validity of the specifications, I conduct balancing tests to show that the instrument of the study is plausibly quasi-random across cohorts, within schools. In addition, following Lavy and Schlosser (2011), I use falsification tests using placebo treatments to confirm that estimated peer influence is not driven by any short-term effects of school-level unobserved confounders.

2. Methods

2.1. Data

The present study uses school-based survey data collected between October 2011 and March 2012 as part of an HIV/AIDS prevention program for Malawian adolescents, supported by Daeyang Luke Hospital in Malawi, the Korea International Cooperation Agency (KOICA) and Africa Future Foundation in Korea. The target population of the baseline survey was all students in Grade 1 to Grade 3 (equivalent to grades 9 and 11 in the U.S. education system)

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