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ABSTRACT

"It Wasn't Me, It Was Them!" Social Influence in Risky Behavior by Adolescents*

Many years of concerted policy effort in Western countries has not prevented young people from experimenting with cigarettes, alcohol and marijuana. One potential explanation is that social interactions make consumption "sticky". We use detailed panel data from the Add Health survey to examine risky behavior (the consumption of tobacco, alcohol and marijuana) by American adolescents. We find that, even controlling for school fixed effects, these behaviors are correlated with lagged peer group behavior. Peer group effects are strongest for alcohol use, and young males are more influential than young females. Last, we present some evidence of non-linearities in social interactions.

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Keywords: social interactions, smoking, drinking

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1 Introduction

Recent survey results on adolescent drug use are impressive. American figures show that in 2003 half of 12th-graders had tried cannabis in their life, 54% had tried cigarettes, and more than 77% had tried alcohol (Monitoring the Future Study, http://www.drugabuse.gov).[1] In this context, we may question the efficacy of public policies such as safety campaigns and police intervention in schools designed to prevent or reduce drug consumption.

The limited success of institutional initiatives (Laws and information) suggests some countervailing force encouraging continuing use by adolescents. One candidate is peer pressure, which can render consumption sticky in the face of policy instruments. In this paper we empirically evaluate the proposition that risky behavior by adolescents depends on the behavior of their peers (here, other adolescents in the same school).

We use American data from the Add Health survey (1994-1996) to evaluate the strength of peer group influence in the consumption of cannabis, alcohol and tobacco. The Add Health data is panel, which allows us to avoid some of the endogeneity problems that have dogged the empirical literature. We present results from two peer groups: those in the same school year and friends. As such we are able to identify both the behavior which is most influenceable, and the most pertinent peer group. It is likely that the strength of this influence depends on the individual's sex and the sex composition of his or her peer group.

The data we use contain observations on students in different grades in the same schools. We are thus able to control for any school fixed effects which may otherwise bias the empirical results. We find strong evidence of peer pressure **within** the school, especially for alcohol use. Further, boys are more influential than girls with respect to risky behaviors, and peer pressure is not necessarily linear.

The paper is organized as follows. Section 2 overviews existing work on social interactions in youth behavior, and outlines our approach. Section 3 then presents the Add Health data. Sections 4 and 5 discuss respectively our main results and a number of extensions, and Section 6 concludes.

2 Estimating Social Interactions in Risky Behavior by Adolescents

The analysis of social influence and peer pressure in determining adolescents' educational outcomes goes back at least to Coleman et al. (1966). This theme represented the lion's share of empirical work by economists on social interactions up until the early 1990s.

Duesenberry (1949) initiated the literature on reference group effects in consumer behavior, although this arguably goes back further to Veblen (1899) and Smith (1978). These developments were not followed by his contemporaries, and the subject of comparisons or status fell somewhat into abeyance until the 1970s, when a new theoretical impetus was given to the literature by Becker (1974). Becker's article on the family, although the first to explicitly use the phrase "social interactions" in the title, actually primarily treats the case of a benevolent household head, who distributes the household's gains amongst its members. As such, it is more a model of altruism with reciprocity than a pure model of social interactions. This latter only had to wait until Pollak (1976), who examines the behavioral consequences of preferences depending directly on others' behavior in model of habit formation and learning.

[1] Figures for other Western countries are similar.

A standard empirical equation describing social interactions in a linear fashion, as in Pollak, is:

$$Y_i^t = \alpha + \beta X_i^t + \theta \overline{Y}_j + \epsilon_i^t, \qquad j \neq i; \tag{1}$$

Here Y_i^t is the behavior of individual i at period t; X_i^t are the individual determinants of i's behavior; $\overline{Y}_j$ is reference group behavior (typically not including individual i), and ϵ_i^t is an error term.

This behavioral equation derives from a structural model where others' behavior either provides information about the costs and benefits of behavior, or establishes a benchmark against which the individual's relative standing is determined. The theoretical implications of this equation have been drawn out in, for example, Akerlof (1980); Kandel and Lazear (1992); Glaeser et al. (1996); Clark and Oswald (1998); Brock and Durlauf (2001).

Empirical evidence of concern about relative position has taken a number of forms. Perhaps the largest literature concerns the econometric estimation of individual behavior (which is the approach we follow). Recent contributions in this vein have analyzed saving (Duflo and Saez, 2002), labor supply (Woittiez and Kapteyn, 1998; Aronsson et al., 1999), and students' success at school (Hoxby, 2000; Sacerdote, 2001; Zimmerman, 2003; Fertig, 2003; Hanushek et al., 2003; Arcidiacono and Nicholson, 2005). Alternatively, social interactions can be modeled using experimental techniques (Zizzo and Oswald, 2001; Fehr and Schmidt, 2003; Falk and Ichino, 2003), or by considering subjective measures of well-being as proxy measures of individual utility (Clark and Oswald, 1996; Clark, 2003).[2]

2.1 Manski's Reflection Problem

An equation such as (1) is simple to estimate, using average contemporaneous values by region, school, workplace or whatever to calculate reference group behavior. Charles Manski, in a series of key articles (Manski, 1993, 2000), underscored the many problems of interpretation that result from the estimation of social interactions. Specifically, individual behavior may move conjointly with average group behavior for three different reasons:

- *Endogenous Effects* where individual behavior reacts to the behavior of others in the group;
- *Exogenous or Contextual Effects* where individual behavior reacts to the exogenous characteristics/socioeconomic composition of the group; and
- *Correlated Effects* where individuals in a group behave similarly because they have unobserved similar characteristics or because they are exposed to the same institutional influences (in the context of educational success, for example, students in the same class are taught by the same teacher).

Manski notes that both endogenous and exogenous effects reflect social interactions, whereas correlated effects are rather a statistical, non-social, phenomenon. While endogenous and exogenous effects both reflect social interactions, the policy implications differ sharply. Manski cites the example of a tutoring program which is provided for some students in a school. The achievement of non-tutored students in the same school will improve with endogenous effects,

[2] A related literature has considered expectations interactions (changing information regarding a certain activity as a result of observing the consequences experienced by others who do it), rather than preference interactions (lower stigma from smoking when others smoke): see Kuhn and Gu (1999) with respect to strikes, and Clark and Étilé (2002) with respect to smoking. Grinblatt et al. (2004) conclude that the correlations they observe in automobile purchases reflect expectation rather than preference interactions.

but not with exogenous effects (as the tutoring program does not change the reference group's characteristics).

Unfortunately, a standard regression of individual behavior on group means cannot distinguish between endogenous and exogenous effects, and only in some situations can both be distinguished from correlated effects. This identification difficulty, which Manski calls the reflection problem, arises because group behavior is by definition the aggregation of individual behavior.

Solutions to the reflection problem include using lagged reference group behavior [3], or specifying individual behavior as a non-linear function of the group mean, or as a linear function of some other measure of centrality, such as the median (Manski, 2000, p. 129). Last, an instrumental variable approach can be taken. A further problem underlined is that the researcher rarely knows who exactly constitutes the reference group, and often has to impose it in a relatively *ad hoc* manner.

2.2 Recent Work on Risky Behavior by Adolescents

In a widely-cited article on the influence of family and neighborhood on behavior of disadvantaged youths, Case and Katz (1991) found strong social interaction effects for violence, drug and alcohol use, and gang membership. Evans et al. (1992) analyze teen pregnancy and absenteeism, with the school as the reference group. Their main result, for both pregnancy and absenteeism, is that the social interaction effect which is found in single-equation models disappears in simultaneous equation estimation. They underline the potential importance of endogenous choice of reference group (here school): "if parents have chosen a school for their daughter in which many of her peers are disadvantaged... the probability that their daughter will become pregnant given her peer group is also high" (p.980). This therefore reveals the presence of a correlated effect (regarding the home environment), in Manski's terminology, rather than a social interaction.

In three recent articles evaluating peer pressure in risky behavior by adolescents, the peer group is defined as the neighborhood (Norton et al., 1998) and the school (Gaviria and Raphael, 2001; Powell et al., 2003). In all three, the index of peer group behavior is the percentage (excluding the respondent) engaging in the behavior, and instrumentation allows for the endogeneity of peers' behavior.[4] Both Norton et al. and Gaviria and Raphael find strong evidence of peer group influence. A key result from both papers is that the estimated coefficients on peer group behavior are only little affected by the instrumentation of the latter. As such, there seems to be little evidence of large biases resulting from contextual effects. Gaviria and Raphael (2001) also control for school characteristics, and carry out their estimations on sub-samples designed to split adolescents up by their susceptibility to be influenced by others (whether they moved school recently or not).

Powell et al. (2003) sound a note of caution, however, in that previous instrumentation inadequately controls for price and public policy, and that these latter may be behind significant peer group effects. They introduce such variables, and control for the endogeneity of peer group behavior. Their results show a continuing role for social interactions. Below, we allow for general contextual effects which will be picked up by school-specific fixed effects.

[3] As explicitly assumed in Pollak. Alessie and Kapteyn (1991) is one example of paper using a one-period lag to measure interdependent preferences in a system of demand equations. Woittiez and Kapteyn (1998) use lagged reference group behavior in the estimation of labor supply.

[4] Other studies use measures of peer behavior, $\bar{Y}_j$, as reported directly by individual i, in different ways to estimate social interactions (Kawaguchi, 2004; Krauth, 2004, forthcoming). However, Norton et al. (2003) show that regression estimators are inconsistent when the correctly-measured group behavior variable is replaced by perceived measures from survey respondents.

2.3 Our Approach

We use a very rich panel dataset on American adolescents to evaluate the extent of social interactions in risky behaviors. The data concern students interviewed in number of different schools. These data present a number of advantages over those used in some of the existing literature. First, we can appeal to the arrow of time, and use lagged peer group behavior as a right-hand side variable. As such, we avoid one aspect of the reflection problem: while my behavior may depend on what my peers did in the past, their past behavior cannot depend on what I currently do.

Second, the composition of the reference group, which is here based on other students in the same school, is likely to be at least partly exogenous. However, following Gaviria and Raphael (2001),[5] we know whether the families concerned are recent movers, or whether the adolescent's parents chose the neighborhood for the school, and we will use this information to control for the endogeneity of school choice. In addition, as we have information on a number of different individuals within the same school (up to 1721 students interviewed in the largest school in the sample), we are able to introduce school-specific fixed effects into the behavior equations. These control for unobserved characteristics that are shared by adolescents attending the same school, and for the influence of the school itself on the behavior of adolescents who attend it (contextual effects).[6] This is one useful way of controlling for the contextual effects underlined by Manski (1993).

Third, as the data come from students in different school years within the same school, we can define a number of distinct peer groups. Our first consists of those who are in the same school year, while a second refers to students who are in the school year above the respondent. It is worth noting that this second type of peer group potentially mitigates the endogeneity problem, older adolescents' consumption may be argued to be only little affected by the behavior of their younger colleagues. Our third reference group is formed by the closest friends that the individual cites, when they are present in the same school, although we are aware that this group is endogenous. We consistently separate reference groups by sex.[7] The empirical results we present below are based on the first and third of these reference groups. The results for "one school year above" are remarkably similar to those for same school year, and are available from the authors on request.

Our fourth advantage is that we have some information on the children's parents (reported by the parents themselves). In particular, we consider the role of parents' income, and of parents' smoking and drinking. We can thus see if smokers' children are more easily influenceable. In general, we allow for some heterogeneity in the degree of influenceability.

Fifth, we consider four different types of behavior (smoking, drinking, drunkenness, and marijuana use), and are able to draw distinctions between the strength of peer group effects between different behaviors. The survey includes information on both participation in the activity and the degree of consumption (both whether the adolescent is a smoker and the number of cigarettes smoked per day, for example). We are hence able to compare the estimation results from Probit participation and Tobit consumption equations, including average (lagged) participation and consumption as explanatory variables.

Last, almost all of the existing literature has used mean behavior as a measure of peer pres-

[5] Who themselves follow a recommendation of Glaeser (1996).

[6] School-specific fixed effects to control for the environment are introduced in a number of recent papers (Alexander et al., 2001; Hanushek et al., 2003; Kawaguchi, 2004; Soetevent and Kooreman, 2004; Arcidiacono and Nicholson, 2005).

[7] As in Duflo and Saez (2002), Kooreman (forthcoming), Kling et al. (2005), and Soetevent and Kooreman (2004).

sure. We look for non-linearities by including dummy variables for different degrees of peer group participation.

3 Data

We use panel data from the National Longitudinal Study of Adolescent Health (*Add Health*, contractual data: Udry, 2003), which comprises a stratified sample of 80 high schools and 52 middle schools from the U.S. The sample is representative of American schools with respect to region, urbanization, school type, ethnicity, and school size. The survey covers health and related behaviors of adolescents who are in school at between the 7th and 12th grades. The Add Health survey was initially carried out in three parts (Harris et al., 2003).[8]

The first, short, survey, called the In-School survey (September 1994 - April 1995) covered 90118 adolescents in 144 schools. The second, called In-Home I (April 1995 - December 1995), comprised long interviews with 20745 adolescents representative of those sampled in the In-School survey. These adolescents' parents were also interviewed. Last, the In-Home II survey (April 1996 - August 1996) repeated these long interviews with 14738 of the adolescents from In-Home I.[9]

In this paper, we use the In-Home I and In-Home II surveys. Two waves of survey data are not enough to estimate rational addiction models, but they do enable us to use lagged values of reference group consumption (In-Home I) in the equation for individual consumption behavior (from In-Home II). This is one of the strong points of the dataset used. We also use school-specific fixed effects. In our estimation sample, we select schools with five or more pupils interviewed. We have information on around 9600 students in these schools. The number of students interviewed per school ranges from 5 to 591, with an average figure of just over 70.

3.1 Measures of Risky Behavior and Peer Groups in the Add Health Data

We concentrate on four different types of risky behaviors. The Add Health questionnaire at the In-Home Waves I and II asks adolescents about both participation and consumption. Survey administrators took a number of steps to ensure the confidentiality of the data and minimize biases from self-reporting. Respondents were not provided with a printed questionnaire; rather the interviewer read the questions aloud and entered the respondent's answers on a laptop computer. For sensitive topics like sexual and illegal behavior or substance use, the adolescents listened to pre-recorded questions through headphones and entered the answers themselves on the laptop. Neither the interviewer nor the other people in the room heard either the questions or the answers. The specific questions regarding participation and consumption are as follows.

1) Participation (=1 if answer >0)

- **Cigarettes:** During the past 30 days, on how many days did you smoke cigarettes?
- **Alcohol:** During the past 12 months, on how many days did you drink alcohol?
- **Drunkenness:** Over the past 12 months, on how many days have you gotten drunk or "very, very high" on alcohol?
- **Marijuana:** During the past 30 days, how many times did you use marijuana?

[8] A fourth wave was added between August 2001 and April 2002.

[9] Full details of the Add Health data are available at http://www.cpc.unc.edu/addhealth.

2) Consumption

- **Cigarettes:** During the past 30 days, on how many days did you smoke cigarettes? $\times$ During the past 30 days, on the days you smoked, how many cigarettes did you smoke each day?
- **Alcohol:** During the past 12 months, on how many days did you drink alcohol? $\times$ Think of all the times you have had a drink during the past 12 months. How many drinks did you usually have each time?
- **Drunkenness:** Over the past 12 months, on how many days have you gotten drunk or "very, very high" on alcohol?;
- **Marijuana:** During the past 30 days, how many times did you use marijuana?

For all four behaviors, we thus have a binary variable reflecting participation in the activity, and a continuous variable showing the intensity of this participation. We will model both of these below.

Table 1 shows the distribution of these measures in both waves of the Add Health data that we use, for both Young Males and Young Females. Note that consumption is by definition zero for those who do not participate; the average consumption figures include these zeroes. Participation rates for alcohol and drunkenness are both around 40%, with little sex difference. Those for tobacco and marijuana are lower, at 26% and 14% respectively, with a somewhat higher level of participation by adolescent males. The sex differences are more pronounced in the consumption figures, shown in the second panel of Table 1. Although participation with respect to alcohol is similar for adolescent males and females, the intensity of this participation (as measured by number of alcoholic drinks and number of episodes of drunkenness) is twice as high for boys as for girls.

Our aim in this paper is to relate these patterns of individual participation and consumption to the behavior of others with whom the individual interacts. The Add Health data is extremely useful in this respect, as interviews were carried out, at two separate points in time, with students in different school years within the same school. In addition, respondents were asked to identify a number of their friends; in the vast majority of cases, the respondent and his/her friends were present in the same school (see Haynie, 2001).

We present results for two peer groups:

- Other adolescents in the same school year; and
- the individual's friends (if they are interviewed).

We systematically split peer group behavior by sex, to see if peer group effects, when they exist, are stronger within or across sexes.

One aspect of social interactions that has dogged previous research is the specification of the reference group. First, it is important to know which reference group is relevant (the street, the town, colleagues, friends?); second we need to have first-hand information on the behavior of this reference group; and last, there is the issue of the endogeneity of reference group choice. We believe that Add Health data allow us to make considerable progress on all fronts. There can be little doubt that those in the same school are an important part of the adolescent's social landscape,[10] and in the Add Health data these colleagues are interviewed directly about their

[10]The degree and frequency of contact is very likely to be relevant. The (enforced) amount of close interaction ensures that school colleagues are a salient reference group. Oreopoulos (2003) finds that family correlations are far more important than neighborhood correlations in determining long-run labor market outcomes.

own behavior. In addition, adolescents' parents likely do not choose their children's schools as a function of the behavior of their pupils with quite the same ease as adults choose their friends according to shared interests. To the extent that there is some choice, we explicitly control for families who moved recently, and who chose the neighborhood partly for its school(s).

3.2 Empirical Approach

We amend the standard social interactions equation given by (1) in two arguably attractive ways. First, our panel data enable us to use lagged values of reference group behavior, so that $\overline{Y}_j = \overline{Y}_j^{t-1}$: adolescents' behavior at t is correlated with average reference group behavior one year earlier. The vector of reference group variables includes lagged behavior separately for boys and girls. Second, we control for the role of the school. We estimate:

$$Y_{is}^t = \alpha + \beta X_{is}^t + \theta \overline{Y}_{js}^{t-1} + \psi D_s + \epsilon_i^t, \qquad j \neq i; \tag{2}$$

The s subscript indicates that individual i is in school s; we explicitly control for school type via school dummies in all regressions. As is usual, these school-specific fixed effects will pick up characteristics that are common to all students within the same school. In Manski's terms, these allow us to at least partly control for (non-social) correlated effects which result from the school's institutional environment. In practical terms, these will reflect supply conditions such as the ease of availability (the often-cited "dealer in the school" effect), and local prices. As such, they reflect contextual effects.

We model both participation and consumption of cigarettes, alcohol, and cannabis, and frequency of drunkenness by adolescents. Adolescents probably have a better idea about their reference group's participation rate than about levels of consumption. As such, we expect Probit participation equations to yield sharper results than Tobit consumption equations.

4 Social Interaction Regression Results

4.1 Participation

Table 2 presents the full results for one of our estimations: the influence of lagged participation by others in the same school year on the individual's own current participation. The key interaction variables appear in the first two rows, and show that, for three out of the four behaviors, lagged participation by the male peer group (male students in the same school year) is significantly correlated with the probability that the individual currently participates in that behavior. There are, however, no significant correlations between lagged female peer group behavior and current participation. We shall explore gender differences in more detail below.

Two points are worth emphasizing. The first is that, as is standard in this literature, these interaction results are found conditional on a wide range of control variables. These controls concern both the adolescent and his/her parents. The results for the individual control variables show that use of cigarettes, alcohol and marijuana is more widespread for whites, older schoolchildren, and adolescents with higher incomes.[11] Regarding the household, cigarette participation is higher amongst recent movers, and marijuana use more widespread in single-parent families. Regarding parents' characteristics, unemployment is generally associated with greater participation by children. Choice of neighborhood for the school by parents is associated with lower cigarette

[11] The lower consumption levels of intoxicants by minority groups is well-known in the literature.

participation only.[12] Parents' alcohol and tobacco participation are both significant predictors of all four risky behaviors modeled.

The second point is that we introduce school controls. One approach would be to introduce school characteristics, such as size, public/private, and broad geographic location. Here we adopt a more general specification, by introducing school dummy variables. It is worth emphasizing that the estimated coefficients at the top of Table 2 therefore reflect the effect of different male peer group participation rates **within the same school**. As such, they represent robust evidence of social interactions in adolescents' behavior. The school dummies impact critically on the estimated peer group coefficients. To illustrate, Table 3 presents marginal effects in two otherwise identical regressions, the first without school dummies and the second with. The estimated coefficients on these school dummies are jointly very significant, as revealed by the Chi-squared statistics at the foot of the table. A regression without school dummies (but with all of Table 2's other controls) would have all eight peer group effects very significant. The introduction of school fixed effects renders all of the female peer group effects insignificant. In addition, the t-statistic on the male peer group with respect to marijuana participation drops from over six to one. The observed interaction in the top panel seems to have resulted from a common omitted variable, as Manski has emphasized: perhaps the "dealer in the school variable". This serves as a salutary lesson to those who see interactions as soon as behaviors are correlated. All of our regressions include school fixed effects.

Table 4 summarizes our interaction results with respect to adolescents' participation in smoking, drinking, drunkenness and smoking marijuana. For ease of presentation, only the estimated coefficients (marginal effects) on the peer group effects are presented: the other explanatory variables are as in Table 2. We are interested in differences between adolescent boys and girls in the role of social influence on risky behavior. It is natural to ask whether this effect depends on the sex of respondent. In other words, do boys follow boys and girls follow girls? We therefore present both aggregate results and results split by sex.

Table 4 shows consistent evidence of peer group effects with respect to alcohol. If participation in drinking alcohol by the male peer group in the same school year increases by 25 percent, the adolescent's probability of drinking alcohol increases by 4.5 percent (to be compared to figures of 4.5 percent and 8.9 percent in Gaviria and Raphael, 2001, for OLS and 2SLS estimation, using both boys and girls as the peer group). For cigarettes, an analogous rise in peer smoking increases the adolescent's probability of smoking by 2.2 percent (to be compared to a figure of 3.9 percent in Gaviria and Raphael, 2001, for both OLS and 2SLS estimation, using both boys and girls as the peer group).

In summary, for the school year reference group in Table 4), both boys and girls follow boys; the female peer group is not influential.[13] The probability of having had an alcoholic drink over the past twelve months is, within the school, positively correlated with the percentage of boys in the same school year who drank one year ago. This general result holds whether we consider the same school year or the school year above as the relevant reference group. It is striking that the estimated interaction coefficient on the school year above is half of that with respect to the current school year, which can be interpreted as revealing the importance of different reference groups.

A last point is that the structure of the estimated coefficients is very similar between adoles-

[12]This in no way suggests that there is no endogeneity problem from school choice. This bias would only be revealed by a fixed effect comparison of otherwise identical adolescents, one of whom's parents moved neighborhood for the school, while the other's did not.

[13]Bianchi and Summala (2004) find a similar pattern by sex, although in a different context. They show that father's driving behavior is more important than mother's in predicting children's ordinary traffic violations.

cent boys and girls: although young men may be more influent, both young men and women are just as influenceable. When the male peer group's alcohol participation in the same school year rises by 25 percent, the male's probability of drinking increases by 5.5 percent, with an analogous figure for females of 4.4 percent. The effect of an increase (25%) in male peer group drunkenness is smaller for young females (3.9 percent compared to 5.7 percent for young males).

The last panel of Table 4 shows the results with respect to friends' (lagged) participation. As suspected, the interactions here are far larger, and virtually all of the estimated coefficients are significant. This either reflects the endogeneity of the reference group ("birds of a feather"), or the importance of friends in peer group effects. Even so, the size of the social interaction effect with respect to young males' alcohol use and drunkenness is not sharply different between the friends and same school year reference groups. One interpretation is that friends are not primarily chosen for their proclivity to drink. Finally, as in the school year results, we find stronger intra- than inter-sex correlations.

Both Krauth (2004, forthcoming) and Kawaguchi (2004) consider social interactions from friends:[14] the former with respect to cigarettes, and the latter with respect to cigarettes, alcohol and marijuana. In Table 4, the increase in probability of individual smoking is 4.6 percent from male friends and 5.2 percent from female friends. The sum of these is close to the effect estimated from a structural model with no sorting in Krauth's papers, whereas Kawaguchi finds an increase of 5.1 percent. For alcohol, we are closer to Kawaguchi's estimate (our cumulate effect is 6.1 percent compared to 6.6 percent in Kawaguchi), but not for marijuana (our total figure is 5.7 percent, compared to 3.5 percent in Kawaguchi).

4.2 Consumption

The Tobit consumption equations use lagged average peer group consumption as an explanatory variable. Again, only the estimated interaction effects are presented (Table 5). The structure of these estimated coefficients is broadly similar to that in the Probit participation regressions above. Although the friends' interactions are mostly positive and significant, the only significant school year peer group effects are found with respect to alcohol and for the lagged consumption of young males.

In general, the social interactions in the Tobit consumption equations are somewhat less significant than those in the Probit participation equations. One interpretation is that the adolescent "econometrician" probably has more accurate information regarding peer group members' participation than on their consumption. This is less obvious for friends, which is the group that individuals can observe the most easily.

5 Further Results and Extensions

In this section we present three extensions of our main result: that risky behaviors by American adolescents seem to be subject to strong peer group effects, especially from young males.

5.1 Consumption and participation

It is possible that reference group average consumption and reference group participation do not reflect the same phenomena, and will not have the same effect on individual behavior. Table 6

[14] Note that they both use perceived peer behaviors.

presents an empirical test of this hypothesis, whereby both peer group consumption and participation are introduced into the participation equation.[15] The reference group here is same school year.

The results to a large extent confirm our earlier reading of Tables 4 and 5. In a head-to-head fight, peer group participation is a more important determinant of individual behavior than is peer group average consumption. Again, the significant social interactions are largely restricted to alcohol and drunkenness. It is of interest to note, however, that, for both the whole sample and adolescent males, both male peer group participation **and** consumption are significant in the alcohol equation, suggesting separate roles for presence and intensity in influencing adolescents' drinking. There is also a solitary example of cross-sex influence, in that adolescent males' participation in smoking is found to be positively correlated with the average consumption of cigarettes by young women in the same school year one year earlier.

As above, it is tempting to interpret the relative importance of the participation and consumption variables as reflecting the accuracy of the information which is available to adolescents concerning their peer group's behavior.

5.2 Non-linearities

The empirical literature on social interactions has mostly retained a linear specification for peer group behavior. Our first thought was that perhaps higher moments of the distribution of peer group consumption might be important too (Manski, 2000, p. 129).

In the first instance, we considered two additional measures of distribution, in addition to mean consumption. The first is a measure of distribution proposed by Fertig (2003)[16]. The second is the Gini coefficient. The results (which are not reproduced here) reveal no significant correlations between the distribution of peer group consumption (holding its mean level constant) and individuals' participation in risky behavior. Several of the estimated coefficients on the Gini are negative with t-statistics of around 1.5, providing suggestive, but not significant, evidence that more unequally distributed peer group consumption of alcohol and tobacco reduces the probability that adolescents participate in the behavior in question.

Our second investigation of non-linearity applies to participation rates, rather than the level of consumption. We divide reference group participation up into four categories: 0-25%; 25-50%; 50-75%; and 75-100%. The modal category is either 0-25% or 25-50%, depending on the behavior considered, and there are relatively few observations in the top category. Table 7 presents the results from Probit participation equations, as in Table 4, but with peer group participation now being measured by three dummy variables (the omitted category is 0-25%).

The estimated coefficients on the peer group participation dummies reveal some significant non-linearities. This is perhaps best seen by comparing the coefficient on the 50-75% dummy with its counterpart for the 75-100% group for alcohol and drunkenness. If the social interaction effect is linear, then we would expect the latter to be 40 per cent larger than the former (compare the midpoints: 87.5/62.5=1.4). While this restriction holds (statistically) for drunkenness, this is not the case for alcohol use. The estimated coefficient on the 75-100% male peer group dummy is over twice as large as that on the 50-75% dummy in the whole sample; for young males the ratio is three to one. This suggests substantial convexities in the interactions between adolescent males.

[15] The qualitative results are identical in the consumption equation.

[16] This heterogeneity measure is given by $C_{-is} = \frac{\widehat{Var}(y_{-is})^{1/2}}{\overline{y}_{-is}}$, where y_{-is} is the consumption of individuals in reference group s less individual i.

5.3 Who's under the influence?

In the last extension we seek to identify certain demographic groups which are more influenceable than others. As our sample is homogeneous in terms of many demographic characteristics, the results we consider here refer to mostly parents' characteristics (obtained from interviews with the parents themselves, rather than reported by the adolescents).

Our first set of interactions refers to the household's moving history. We know both whether the household moved recently, and whether the parents chose the current neighborhood partly as a function of the school. We examine whether adolescents in these households are more or less receptive to their peer group's behavior. We have no particular prior here, although (Gaviria and Raphael, 2001) suggest that recent movers may be more susceptible to peer group pressure, at least with respect to the consumption of marijuana and cocaine. We interact the dummy variables for recent mover and parents' choice of neighborhood with the peer group variables. No significant estimates result. This is not to say that outcomes will necessarily be the same between the groups (the schools which parents choose may well have a lower participation/consumption rate amongst the students), but any outcome difference is not due to differences in susceptibility.

Our second set of results refers to parents' characteristics. We suspect that the children of smokers or drinkers may be less receptive to the behavior of others at school, perhaps because they are better informed about the associated risks. The interaction variables between parents' smoking and peer group smoking rate are positive and significant. The children of smokers are thus rather more susceptible to their peers' smoking behavior. The same experiment carried out for drinking also revealed positive coefficients, but insignificant.

There are no significant results with respect to parents' income, where we split the sample in two based on parents' total income in 1994; the median value is around $38 000. "Rich kids" are not, by and large, more easily influenced, at least with respect to the behavior of the whole school year (it may be that certain sub-groups influence richer and poorer children differently). Experiments with cutting parents' income into three categories were no more conclusive.

Last, if we interact peer behavior with being in the top or bottom half of the reference group consumption distribution last year, we find that those who consumed relatively little are more sensitive to their peers' behavior. Also, we can show that older adolescents (15 or over) respond more to their peers' behavior than do their younger counterparts.[17]

In general, although only some of our results in this section are significant, we believe that future work should pay more attention to the identification of demographic groups which are more reactive to social pressure.

6 Conclusion

This paper has contributed to the empirical literature on social interactions. We used Add Health survey data to investigate the effect of peer group influence in four different "risky behaviors" (smoking, drinking, drunkenness, and marijuana use). Our use of panel data has allowed us to circumvent part of the omnipresent endogeneity problem by using lagged values of peer group behavior. In addition, the particularly rich dataset has allowed us to control for not only parents' characteristics but also to introduce school fixed effects, arguably avoiding many of the omitted variable problems that have dogged previous estimates. We have information on the behavior of different adolescents within the same school. This has allowed us to evaluate correlations with

[17] There is also some suggestive evidence that children in rural schools are more susceptible to peer pressure, as measured by marginal effects, than their counterparts in urban schools. An analogous finding with respect to car purchases is presented by Grinblatt et al. (2004).

three plausible peer groups: the same school year within the school, those in the school year above the respondent within the same school, and the respondent's friends.

We find significant peer group effects for alcohol and drunkenness, particularly with respect to the male peer group, for all three peer groups. There is little evidence that the female peer group affects individual behavior, except in the case of friends (where there is potential endogeneity). The school fixed effects are very significant. There are "smoking" schools and "drinking" schools. In this paper we have been able to show that students within these schools are sensitive to their peers' behavior. What we have not examined is why some schools, on average, exhibit higher levels of risky behavior. Taking the estimated school effects and relating them to neighborhood characteristics would, in particular, seem like a worthwhile project.

Further results suggest that others' participation is a stronger predictor of individual behavior than others' consumption, and that some demographic groups are more influenceable than others (the children of smokers and older children). We also present some evidence of non-linearities in peer group influence, whereby a peer group with 60% of smokers may have more than twice the influence of a peer group with 30% of smokers.

Given social interactions, any policy impact on consumption, whether positive or negative, will be amplified through peer group effects. As such it is not enough to evaluate a targeted policy by its impact on the target group: there will likely be significant further spillovers. What may have looked like an initially small effect of government policy on (say) drinking will grow over time as adolescents copy each other? This snowball effect will be all the greater if younger adolescents copy their older peers, (and we find some evidence of this).

Our findings suggest that such copycat effects may make intervention more effective with respect to alcohol than to cigarettes or marijuana. Second, not all adolescents are the same in terms of either their influence or their susceptibility. Boys are more influential than girls, and children of smokers are more susceptible. The most effective use of resources in the fight against adolescent drinking and smoking should bear these differences in mind.

Last, non-linear peer group effects suggest that it may be more than twice as important to target a "heavy smoking" school or group, than to target two schools with smoking rates half as high. As such, we provide some justification for the specific targeting of problem groups or schools, as it is these that have an unduly large impact on the behavior of others.

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Tables

Table 1: Participation rates and consumption levels in behaviors by adolescents (*Add Health, In-Home I & II*)

	"In-Home I"			"In-Home II"		
	Mean	**Std. Dev.**	**N**	**Mean**	**Std. Dev.**	**N**
PARTICIPATION (%)						
Cigarettes during the last 30 days						
All	26.1	0.44	20038	31.9	0.46	14542
Young Males	26.6	0.44	9902	32.7	0.46	7070
Young Females	25.5	0.43	10136	31.2	0.46	7472
Alcohol during the last 12 months						
All	41.0	0.49	20124	36.6	0.48	14593
Young Males	40.9	0.49	9949	36.5	0.48	7086
Young Females	41.0	0.49	10175	36.7	0.48	7507
Drunkenness during the last 12 months						
All	39.0	0.48	19482	35.7	0.47	14392
Young Males	39.1	0.48	9646	35.6	0.47	6985
Young Females	39.0	0.48	9836	35.9	0.47	7407
Marijuana during the last 30 days						
All	14.4	0.35	19949	16.0	0.36	14374
Young Males	16.3	0.37	9831	17.8	0.38	6955
Young Females	12.5	0.33	10118	14.3	0.35	7419
CONSUMPTION						
Cigarettes during the last 30 days						
All	40.1	128.5	19981	50.8	146.3	14506
Young Males	45.1	141.4	9868	55.3	157.6	7045
Young Females	35.2	114.5	10113	46.6	134.7	7462
Alcohol during the last 12 months						
All	96.7	381.4	19678	103.1	386.7	14206
Young Males	129.3	467.6	9670	136.3	452.3	6865
Young Females	65.2	269.7	10008	72.1	309.9	7341
Drunkenness during the last 12 months						
All	9.8	38.9	20087	11.79	43.92	14563
Young Males	13.1	46.1	9924	15.51	50.71	7070
Young Females	6.7	30.0	10163	8.3	36.02	7493
Marijuana during the last 30 days						
All	1.6	8.98	19938	1.8	9.37	14372
Young Males	2.2	11.47	9820	2.5	12.12	6953
Young Females	1.0	5.55	10118	1.1	5.632	7419

Table 2: Probit participation equation with reference group (same school year) participation rate, full estimation (*Add Health, In-Home II*)

	Tobacco		Alcohol		Drunkenness		Marijuana	
Variable	**Coef.**	**(S.E.)**	**Coef.**	**(S.E.)**	**Coef.**	**(S.E.)**	**Coef.**	**(S.E.)**
ADOLESCENT								
Male peer group	0.253†	(0.139)	0.483**	(0.119)	0.460**	(0.121)	0.251	(0.217)
Female peer group	-0.068	(0.148)	0.139	(0.123)	0.130	(0.125)	-0.152	(0.252)
Female	0.008	(0.028)	0.079**	(0.027)	0.080**	(0.028)	-0.130**	(0.032)
Age	0.870**	(0.174)	0.819**	(0.168)	0.903**	(0.176)	1.136**	(0.208)
Age^2	-0.025**	(0.005)	-0.022**	(0.005)	-0.024**	(0.005)	-0.034**	(0.006)
Recent mover	0.119*	(0.055)	0.060	(0.053)	0.053	(0.055)	0.022	(0.062)
White	*Reference*							
Black	-0.702**	(0.055)	-0.366**	(0.051)	-0.408**	(0.053)	-0.148*	(0.061)
Hispanic	-0.025	(0.074)	0.032	(0.071)	0.050	(0.074)	0.306**	(0.081)
Asian	-0.194*	(0.093)	-0.362**	(0.090)	-0.362**	(0.092)	-0.194†	(0.112)
Native	0.116	(0.196)	-0.151	(0.204)	-0.169	(0.212)	-0.207	(0.229)
Other origin	-0.087†	(0.051)	0.016	(0.050)	0.017	(0.051)	0.174**	(0.057)
One parent	0.043	(0.033)	0.035	(0.032)	0.061†	(0.033)	0.115**	(0.037)
Weekly earnings (100$)	11.194**	(1.872)	8.885**	(1.767)	8.798**	(1.815)	11.497**	(1.956)
PARENT								
Age	0.001	(0.002)	0.005*	(0.002)	0.006*	(0.002)	0.003	(0.003)
Born in USA	0.156**	(0.057)	0.050	(0.053)	0.031	(0.055)	0.359**	(0.066)
Public assistance	0.125*	(0.055)	-0.055	(0.054)	-0.077	(0.056)	0.072	(0.064)
Work outside home	0.028	(0.049)	0.034	(0.047)	0.029	(0.049)	0.013	(0.058)
Unemployed	0.167*	(0.067)	0.131*	(0.065)	0.104	(0.068)	0.169*	(0.077)
Full-time work	0.088*	(0.041)	0.014	(0.039)	0.010	(0.040)	0.074	(0.048)
PTA member	-0.069*	(0.032)	0.015	(0.031)	0.023	(0.032)	-0.043	(0.037)
Choose school	-0.067*	(0.030)	0.004	(0.029)	-0.001	(0.030)	-0.007	(0.034)
Income (10$)	-0.028	(0.032)	0.050†	(0.029)	0.059*	(0.030)	-0.023	(0.035)
No money problems	-0.066†	(0.038)	0.054	(0.037)	0.051	(0.038)	0.042	(0.044)
Alcohol participation	0.110**	(0.031)	0.233**	(0.030)	0.240**	(0.031)	0.171**	(0.036)
Tobacco participation	0.155**	(0.032)	0.098**	(0.032)	0.119**	(0.033)	0.152**	(0.037)
(School dummies)								
Constant	-8.424**	(1.441)	-8.742**	(1.392)	-9.568**	(1.458)	-11.050**	(1.726)
N	9615		9672		9262		9454	
LL	-5543.2		-5887.8		-5550.3		-3842.2	
χ^2	$\chi^2_{(158)}$=927.5		$\chi^2_{(157)}$946.9		$\chi^2_{(157)}$985.6		$\chi^2_{(155)}$597.9	

Significance levels: †=10%; ∗=5%; ∗∗=1%

With robust Huber/White/Sandwich estimator of variance.

Table 3: The Impact of School Dummies with Same school year as reference group; Probit participation equation; marginal effects (*Add Health, In-Home II*)

	Tobacco		**Alcohol**		**Drunkenness**		**Marijuana**	
Variable	**Coef.**	**(S.E.)**	**Coef.**	**(S.E.)**	**Coef.**	**(S.E.)**	**Coef.**	**(S.E.)**
WITHOUT SCHOOL DUMMIES								
Male peer group	0.220**	(0.040)	0.248**	(0.036)	0.259**	(0.036)	0.255**	(0.030)
Female peer group	0.182**	(0.036)	0.141**	(0.035)	0.131**	(0.035)	0.174**	(0.041)
N	9615		9672		9262		9454	
Log-likelihood	-5658.9		-5995.7		-5654.4		-3941.5	
	$\chi^2_{(25)}$=789.2		$\chi^2_{(25)}$=812.9		$\chi^2_{(25)}$=872.0		$\chi^2_{(25)}$=431.3	
WITH SCHOOL DUMMIES								
Male peer group	0.088†	(0.049)	0.181**	(0.044)	0.170**	(0.044)	0.055	(0.049)
Female peer group	-0.024	(0.052)	0.052	(0.046)	0.048	(0.046)	-0.033	(0.056)
N	9615		9672		9262		9454	
Log-likelihood	-5543.2		-5887.8		-5550.3		-3842.2	
	$\chi^2_{(158)}$=1020.6		$\chi^2_{(157)}$=1028.7		$\chi^2_{(157)}$=1080.1		$\chi^2_{(155)}$=630.0	
Likelihood-ratio test	$\chi^2_{(133)} = 231.4$		$\chi^2_{(132)} = 215.7$		$\chi^2_{(132)} = 208.2$		$\chi^2_{(130)} = 198.6$	

Significance levels: †=10%; ∗=5%; ∗∗=1%

Other variables as in Table 2.

Table 4: Probit participation equation; two reference groups; marginal effects (*Add Health, In-Home II*)

	Tobacco		Alcohol		Drunkenness		Marijuana	
Variable	**Coef.**	**(S.E.)**	**Coef.**	**(S.E.)**	**Coef.**	**(S.E.)**	**Coef.**	**(S.E.)**
REFERENCE GROUP: THE SAME SCHOOL YEAR IN SAME SCHOOL								
Whole sample								
Male peer group	0.088†	(0.049)	0.181**	(0.044)	0.170**	(0.044)	0.055	(0.049)
Female peer group	-0.024	(0.052)	0.052	(0.046)	0.048	(0.046)	-0.033	(0.056)
N	9615		9672		9262		9454	
Young males								
Male peer group	0.102	(0.071)	0.220**	(0.063)	0.227**	(0.063)	-0.003	(0.073)
Female peer group	-0.041	(0.079)	0.067	(0.066)	0.036	(0.067)	-0.035	(0.089)
N	4722		4745		4522		4581	
Young females								
Male peer group	0.089	(0.071)	0.176**	(0.065)	0.154*	(0.065)	0.115†	(0.069)
Female peer group	-0.004	(0.072)	0.042	(0.066)	0.057	(0.067)	-0.040	(0.074)
N	4867		4884		4675		4595	
REFERENCE GROUP: FRIENDS								
Whole sample								
Male peer group	0.185**	(0.023)	0.118**	(0.022)	0.131**	(0.022)	0.123**	(0.019)
Female peer group	0.208**	(0.024)	0.127**	(0.021)	0.125**	(0.021)	0.105**	(0.022)
N	3503		3502		3444		3235	
Young males								
Male peer group	0.222**	(0.033)	0.134**	(0.033)	0.161**	(0.034)	0.184**	(0.032)
Female peer group	0.131**	(0.037)	0.081*	(0.032)	0.080*	(0.033)	0.103**	(0.040)
N	1659		1686		1656		1475	
Young females								
Male peer group	0.129**	(0.036)	0.105**	(0.033)	0.107**	(0.034)	0.074*	(0.031)
Female peer group	0.281**	(0.034)	0.176**	(0.030)	0.163**	(0.031)	0.129**	(0.031)
N	1733		1734		1694		1313	

Significance levels: †=10%; ∗=5%; ∗∗=1%

With robust Huber/White/Sandwich estimator of variance.

Other variables as in Table 2.

Table 5: Tobit consumption equation; two reference groups (*Add Health, In-Home II*)

	Tobacco		Alcohol		Drunkenness		Marijuana	
Variable	**Coef.**	**(S.E.)**	**Coef.**	**(S.E.)**	**Coef.**	**(S.E.)**	**Coef.**	**(S.E.)**
REFERENCE GROUP: THE SAME SCHOOL YEAR IN SAME SCHOOL								
Whole sample								
Male peer group	0.110	(0.126)	0.162*	(0.077)	0.071	(0.132)	0.071	(0.188)
Female peer group	0.116	(0.166)	0.043	(0.135)	-0.270	(0.224)	-0.086	(0.387)
N	9574		9281		9685		9507	
Young males								
Male peer group	0.006	(0.192)	0.288*	(0.129)	0.113	(0.211)	-0.141	(0.305)
Female peer group	0.525*	(0.261)	0.026	(0.248)	-0.140	(0.351)	0.473	(0.628)
N	4710		4528		4770		4660	
Young females								
Male peer group	0.211	(0.162)	0.058	(0.086)	0.071	(0.156)	0.220	(0.195)
Female peer group	-0.192	(0.205)	0.100	(0.137)	-0.288	(0.269)	-0.563	(0.379)
N	4864		4753		4915		4847	
REFERENCE GROUP: FRIENDS								
Whole sample								
Male peer group	0.523**	(0.050)	0.175**	(0.037)	0.278**	(0.061)	0.264**	(0.071)
Female peer group	0.640**	(0.066)	0.106†	(0.057)	0.381*	(0.087)	0.693**	(0.177)
N	3534		3446		3538		3496	
Young males								
Male peer group	0.625**	(0.075)	0.231**	(0.053)	0.418**	(0.092)	0.262**	(0.098)
Female peer group	0.585**	(0.109)	-0.025	(0.137)	0.465*	(0.223)	0.637*	(0.270)
N	1753		1698		1756		1736	
Young females								
Male peer group	0.382**	(0.063)	0.093†	(0.050)	0.109	(0.078)	0.224*	(0.095)
Female peer group	0.630**	(0.074)	0.144**	(0.053)	0.337**	(0.079)	0.557**	(0.136)
N	1781		1748		1782		1760	

Significance levels: †=10%; ∗=5%; ∗∗=1%

Other variables as in Table 2.

Table 6: Probit participation equation with peers' participation and peers' consumption; same school year as reference group; marginal effects (*Add Health, In-Home II*)

	Tobacco		Alcohol		Drunkenness		Marijuana	
Variable	**Coef.**	**(S.E.)**	**Coef.**	**(S.E.)**	**Coef.**	**(S.E.)**	**Coef.**	**(S.E.)**
WHOLE SAMPLE								
Participation rate								
Male peer group	0.107†	(0.058)	0.152**	(0.048)	0.170**	(0.046)	0.045	(0.056)
Female peer group	-0.078	(0.059)	0.036	(0.049)	0.046	(0.048)	-0.019	(0.065)
Consumption mean (/100)								
Male peer group	-0.014	(0.020)	0.011*	(0.005)	0.006	(0.060)	0.076	(0.180)
Female peer group	0.044†	(0.025)	0.007	(0.010)	-0.012	(0.103)	-0.143	(0.375)
N	9593		9468		9257		9450	
YOUNG MALES								
Participation rate								
Male peer group	0.132	(0.084)	0.174**	(0.067)	0.236**	(0.066)	0.001	(0.084)
Female peer group	-0.138	(0.089)	0.051	(0.071)	0.037	(0.071)	-0.086	(0.102)
Consumption mean (/100)								
Male peer group	-0.023	(0.028)	0.019*	(0.008)	-0.033	(0.086)	-0.044	(0.264)
Female peer group	0.084*	(0.037)	0.008	(0.015)	-0.015	(0.146)	0.535	(0.543)
N	4710		4618		4518		4577	
YOUNG FEMALES								
Participation rate								
Male peer group	0.098	(0.084)	0.167*	(0.069)	0.135*	(0.067)	0.078	(0.077)
Female peer group	-0.028	(0.081)	0.023	(0.070)	0.050	(0.067)	0.036	(0.083)
Consumption mean (/100)								
Male peer group	-0.008	(0.029)	0.004	(0.008)	0.082	(0.086)	0.251	(0.259)
Female peer group	0.016	(0.034)	0.006	(0.014)	-0.000	(0.149)	-0.881†	(0.531)
N	4857		4807		4674		4595	

Significance levels: †=10%; ∗=5%; ∗∗=1%

With robust Huber/White/Sandwich estimator of variance.

Other variables as in Table 2.

Table 7: Probit participation equation with same school year as reference group and threshold participation rate (*Add Health, In-Home II*)

	Tobacco		Alcohol		Drunkenness		Marijuana	
Variable	**Coef.**	**(S.E.)**	**Coef.**	**(S.E.)**	**Coef.**	**(S.E.)**	**Coef.**	**(S.E.)**
SAME SCHOOL YEAR: *Whole sample*								
Male 25-50%	0.014	(0.041)	0.037	(0.050)	0.075	(0.050)	-0.073	(0.052)
	[0.005]		[0.014]		[0.028]		[-0.015]	
Male 50-75%	0.107	(0.076)	0.131*	(0.061)	0.189**	(0.063)	0.031	(0.244)
	[0.038]		[0.049]		[0.071]		[0.007]	
Male 75-100%	-0.464	(0.454)	0.346**	(0.108)	0.328**	(0.113)	*Dropped*	
	[-0.140]		[0.135]		[0.127]			
Female 25-50%	0.065	(0.043)	0.080	(0.052)	0.031	(0.051)	-0.110†	(0.060)
	[0.023]		[0.030]		[0.011]		[-0.023]	
Female 50-75%	0.042	(0.079)	0.083	(0.064)	0.036	(0.064)	0.227	(0.309)
	[0.014]		[0.031]		[0.013]		[0.056]	
Female 75-100%	0.193**	(0.283)	0.159	(0.120)	0.115	(0.125)	*Dropped*	
	[0.071]		[0.061]		[0.043]			
N	9615		9672		9262		9453	
SAME SCHOOL YEAR: *Young males*								
Male 25-50%	0.044	(0.058)	0.017	(0.074)	0.176*	(0.073)	-0.121†	(0.072)
	[0.015]		[0.006]		[0.065]		[-0.027]	
Male 50-75%	0.098	(0.105)	0.105	(0.090)	0.286**	(0.090)	-0.000	(0.306)
	[0.035]		[0.039]		[0.108]		[-0.000]	
Male 75-100%	-0.167	(0.839)	0.336*	(0.155)	0.481**	(0.159)	*Dropped*	
	[-0.056]		[0.130]		[0.187]			
Female 25-50%	0.036	(0.063)	0.021	(0.078)	-0.037	(0.078)	0.026	(0.091)
	[0.013]		[0.008]		[-0.013]		[0.006]	
Female 50-75%	0.006	(0.126)	0.068	(0.095)	-0.002	(0.094)	-0.208	(0.590)
	[0.002]		[0.025]		[-0.001]		[-0.044]	
Female 75-100%	0.425**	(0.332)	0.195	(0.181)	0.037	(0.198)	*Dropped*	
	[0.162]		[0.075]		[0.013]			
N	4722		4745		4522		4581	
SAME SCHOOL YEAR: *Young females*								
Male 25-50%	-0.006	(0.060)	0.064	(0.073)	-0.023	(0.073)	-0.022	(0.080)
	[-0.002]		[0.024]		[-0.008]		[-0.004]	
Male 50-75%	0.111	(0.114)	0.154†	(0.089)	0.099	(0.091)	0.173	(0.426)
	[0.039]		[0.058]		[0.037]		[0.038]	
Male 75-100%	-0.836	(0.697)	0.414**	(0.157)	0.245	(0.168)	*Dropped*	
	[-0.211]		[0.162]		[0.094]			
Female 25-50%	0.112†	(0.061)	0.162*	(0.074)	0.118	(0.073)	-0.258**	(0.089)
	[0.039]		[0.061]		[0.044]		[-0.046]	
Female 50-75%	0.101	(0.107)	0.131	(0.092)	0.085	(0.092)	0.295	(0.409)
	[0.035]		[0.050]		[0.032]		[0.070]	
Female 75-100%	*Dropped*		0.177	(0.168)	0.169	(0.168)	*Dropped*	
			[0.068]		[0.064]			
N	4862		4884		4675		4595	

Significance levels: †=10%; ∗=5%; ∗∗=1%

Reference for Male are "Male 0-25%" and Reference for Female are "Female 0-25%".

Marginal effect in square brackets.

Other variables as in Table 2.