Problem Set #1

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Problem 1

Part (b).

Frank, K. A., Muller, C., Mueller, A. S. (2013). The embeddedness of adolescent friendship nominations: The formation of social capital in emergent network structures. *AmericanJournalofSociology*, 119(1), 216 − 253.

Part (c).

$$\log\left[\frac{p(\text{new friend nomination}_{ii'})}{1-p(\text{new friend nomination}_{ii'})}\right] = \theta_0$$

local position (based on course selection overlapping)

$+\ \theta_1 \text{membership in same local position}_{ii'}$

homophily

$+\ \theta_2 \text{same race (not white)}_{ii'} + \theta_3 \text{both white}_{ii'} + \theta_4 \text{both girls}_{ii'}$

$+\ \theta_5 \text{both boys}_{ii'} + \theta_6(-|\text{parental education}_i - \text{parental education}_{i'}|)$

$+\ \theta_7(-|\text{age}_i - \text{age}_{i'}|) + \theta_8(-|\text{GPA}_i - \text{GPA}_{i'}|)$

structural constraint

$+\ \theta_9(-|\text{grade level}_i - \text{grade level}_{i'}|) + \theta_{10}\text{indirect friendship links}_{ii'}$

shared activities

$+\ \theta_{11}\text{sports}_{ii'} + \theta_{12}\text{academic}_{ii'} + \theta_{13}\text{arts}_{ii'}$

course overlap

$+\ \theta_{14}\text{extent of course overlap}_{ii'}$

Part (d). New friend nomination (being unilaterally nominated by as new friend) is the endogenous variable, and the other variables including membership in same local position, same race, both white, both girls, etc. are all exogenous.

Part (e). The model is static, nonlinear and deterministic. The model is independent of time changes, the relationship between dependent and independent variables is not linear and the model doesn't include randomness.

Part (f). One important variable missing here is the phyical distance. To study the relationship between local positions and friendship formation between teenagers, the authors control variables in various dimensions including homophily, structural constraint and etc., while they neglect the physical distance, such as the distance between students' residential neighbourhoods, which intuitively also has some significant explanatary power on new social bond. This dimensions should be taken into account when they make the model.

Problem 2
Part (a).

$$P(\text{married} = 1 \mid X = x) = \frac{e^{x'\beta}}{1 + e^{x'\beta}}$$

$$\begin{aligned} x'\beta =& \beta_0 + \beta_1 log\text{age}_i - \beta_2\text{gender}_i - \beta_3\text{age}_i * \text{gender}_i - \beta_4\text{education}_i \\ &+ \beta_5\text{parental marriage status}_i + \beta_6\text{income}_i + \beta_7\text{healthy}_i \\ &+ \beta_8\text{employment}_i + \beta_9\text{employment}_i * \text{gender}_i \\ &+ \beta_{10}\text{married before}_i + \varepsilon_i \end{aligned}$$

Part (d). age, gender, education, income, parental marriage, health, married before, employment
Part (e).
Age: (continuous variable) As people grow older, single people might be more concerned about their marrital status and feel more impulsed to find a partner. So age should be positively correlated with being married. But as age gets older, the margin of increment might decrease.
Gender: (dummy variable, 0 for female and 1 for male) Gender might also be related to marrital status. Assuming at the same age, a man might be less anxious than a woman to be single.
Education: (continuous variable) Education is connected with people's individualistic thinking. A more educated person might feel less impulsed to get married.
Parental Marriage Status: (dummy variable, 0 for divorced and 1 for married)Parental marriage status might influence the family value of children. Children from divorced families might find marriage less meaningless.
Income: (continuous variable) Income is positively related to living standard. A more independent people might feel less pressured to get married and more assured to live on themselves.
Health status: (dummy variable, 0 for not healthy and 1 for healthy) A unhealthy people, such as being retarded and handicapped find it harder to be in a relationship with someone else.
Employment: (dummy variable, 0 for being unemployed and 1 for being employed) Being employed might be helpful for people to find someone to get married. But as for woman, being unemployed might be less harmful for their marriage potential.
Married before: (dummy variable, 0 for never married and 1 for married before) If a person has married before, she might be more likely to marry again for feeling less unsure about developing such relationship.
Part (f).
Given that variables in the model all load demographic information, data collected by General Social Survey can be used for the preliminary test. Alternatively, a self-implemented social survey with information concerned questionnaired can also fultil the goal. Based on the accessible dataset, a multivariate logistic regression analysis should be conducted to detect the causal relationship. If coefficient of each independent variable is significant different from zero, the corresponding factor should be counted as related to marital status in real life.