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DOI: <https://doi.org/10.1016/j.socnet.2023.12.003>

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Journal Article

Published Version

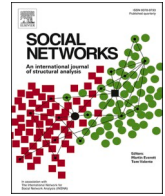


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Originally published at:

Raabe, Isabel J; la Roi, Chaïm; Plenty, Stephanie (2024). Down and out? the role of household income in students' friendship formation in school-classes. *Social Networks*, 78:109-118.

DOI: <https://doi.org/10.1016/j.socnet.2023.12.003>



Down and out? the role of household income in students' friendship formation in school-classes

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ARTICLE INFO

Keywords:

Household income
Friendships
SAOMs
Classroom context

ABSTRACT

Research suggests that coming from a lower economic background compromises social integration at school, yet the precise mechanisms underlying this link remain unknown. Therefore, this study examined the effect of household income on friendship network dynamics among classmates in a large sample of Swedish youths ($n = 4787$ from 235 classes, m age = 14.65, 51% girls, and 33% immigrant background), using multilevel longitudinal social network analysis. Over time, students from poorer households were less often selected as a friend by classmates and they less often initiated or maintained friendship ties than students from higher income households. Furthermore, different conceptualizations of income relative to classmates did not impact friendship formation tendencies. The findings indicate that theories of relative income do not extend understanding of students' friendship formation beyond processes related to absolute income. In addition, this study suggests that the social integration of students from low-income households could be boosted by both promoting their agency in forming friendships and preventing exclusion by classmates.

1. Introduction

Being part of friendship networks at school is a key task for positive development during adolescence. Being socially integrated among classmates carries many advantages, such as building social capital (Ream and Rumberger, 2008) and supporting students' psychological well-being (Birkeland et al., 2014), school motivation (Weyns et al., 2018) and achievement (Raabe, 2019). However, adolescents with fewer economic resources are likely to have fewer positive peer relationships than more affluent youths (Ge and Wang, 2019; Hjalmarsson and Mood, 2015; Sletten, 2010). Understanding the role of economic factors in friendship development is important because poor social integration at school presents an additional challenge in the lives of economically disadvantaged youth, which may perpetuate the obstacles to positive educational, employment, and health outcomes that they already face (Conger et al., 2012).

Our study seeks to improve the state of research in this area in three

respects. First, knowledge on the relative importance of network processes in the poorer integration of economically disadvantaged youths in friendship networks is lacking. It is likely that endogenous processes such as popularity or clustering effects exacerbate inequalities, and not controlling for them could lead to an overestimation of the role of income. With the new availability of large-scale, longitudinal data, we are able to statistically separate the effects of parental income from endogenous social dynamics in the analysis of differential integration for a large number of network groups, through the utilization of multilevel stochastic actor-oriented models (SAOMs). Second, social consequences of students' economic positioning *within* the school context are poorly understood. Yet, given the pivotal role that the school social environment plays in fostering youth development and the importance of social comparison during adolescence, the influence of economic resources on integration in friendship networks may depend on how a youth's situation compares to that of his or her school peers (Bukowski et al., 2020). Third, as many studies rely on youth's self-reports of parental

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¹ Isabel J. Raabe is funded by an Ambizione Grant (PZ00P1_193544) by the Swiss National Science Foundation (SNSF). Chaïm la Roi and Stephanie Plenty acknowledge funding from three research projects funded by the Swedish Research Council for Health, Working Life and Welfare (FORTE) when preparing this manuscript: Grants 2012-1741, 2016-07099, and 2016-00678.

<https://doi.org/10.1016/j.socnet.2023.12.003>

Received 23 June 2023; Received in revised form 27 October 2023; Accepted 15 December 2023

Available online 6 January 2024

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socioeconomic background (e.g., Sletten, 2010), previous findings may be biased due to substantial missing data or measurement error, potentially leading to an underestimation of the effect of economic background on integration at school (Engzell and Jonsson, 2015).

This study aims to fill these gaps by applying multilevel longitudinal social network analysis (stochastic actor-oriented models, SAOMs) to high quality sociometric and register data from a large national sample of Swedish adolescents. Taking a complete network approach allows us to simultaneously analyze how household income is related to the number of in-class friends youths themselves perceive to have and whether classmates perceive youths as friends across time, whilst distinguishing processes related to household income from endogenous network processes and processes related to other dimensions of socio-demographic background that might confound these associations. We investigate if poorer students become less socially integrated at school because household income impedes the social dynamics underlying friendship formation. Importantly, in acknowledgement that economic resources relative to one's school peers may hold importance beyond the effects of absolute resources, we examine the extent to which two theoretical perspectives on relative income help explain such social dynamics.

2. Background

2.1. Adolescents' economic background and friendship formation

Explanations of friendship formation often revolve around the following three factors: the opportunity structure, utility-related considerations, and homophily mechanisms. Below, we argue that arguments relating to the opportunity structure and utility-related considerations may inform how family income can impact adolescents' friendship formation at school.

First, youths with a lower economic background are likely to have less opportunity to form friendships. The probability of developing friendships increases with greater opportunities to meet and spend time with others (Block, 2018). Engaging in organized and unstructured free time activities represent important opportunities to establish and develop friendships. However, youths with few economic resources have limited funds to engage in such social activities (Hjalmarsson and Mood, 2015; Ridge, 2011), potentially making them less active in friendship formation but also less likely to be selected as friends due to lower social visibility. In addition, as residential stability is somewhat lower among low-income families (also in Sweden; Fjellborg, 2022), some students from poorer backgrounds may have reduced opportunities for social integration at school due to more frequent school changes.

In terms of utility, individuals' ability to attract friends depends on the social standing of their attributes, with highly valued traits being more attractive than low valued traits. Affluent youths may be considered more desirable as friends because visual cues, such as expensive belongings, signal a range of appealing attributes assumed to coincide with wealth (Elliott and Leonard, 2004). For example, children make more positive evaluations about the likability and competence (in academics and popularity) of hypothetical peers whose material possessions reflect wealth (e.g., new or design brand clothes) than peers whose possessions reflect low wealth (e.g., worn out or generic brand items), regardless of their own socioeconomic background (Shutts et al., 2016). Thus, youths readily recognize indicators of wealth, and peers perceived as wealthy are likely to be favored and attributed additional positive characteristics compared to youths perceived as poorer. Additionally, adolescents may seek friendships with higher status peers because such relationships allow them to "bask in reflected glory", as associating with high status peers may benefit their own social positioning (Dijkstra et al., 2013).

Simultaneously, youths may be more reluctant to form friendships with lower income classmates due the lower social status associated

with being poor, and assumptions that they are less able to contribute in material or social terms. Additionally, awareness of the social stigma associated with poverty, and shame or anxiety about one's economic background could also inhibit poorer youth's ability or willingness to seek or maintain friendships (Ridge, 2011). Poorer youths may also be deemed less attractive as friends by classmates due to a higher prevalence of emotional and behavioral problems (Devenish et al., 2017; Huisman et al., 2010; Marçal, 2020), presumably due to greater exposure to economic stress and other family-related psychosocial stressors (Bradley and Corwyn, 2002; Devenish et al., 2017). Moreover, such emotional and behavioral difficulties may also increase the risk of adverse peer relationships (e.g., being rejected or bullied), which have been found to be more common for lower income youths (Hjalmarsson, 2018; Tippett and Wolke, 2014), and may further reduce their attractiveness as a friend. As such, these mechanisms could pose an additional threat to school engagement and positive school outcomes for youths from lower income families.

Empirical studies relying on adolescents' self-reported family economy and social relationships have found that having a low-income background was related to spending less time with peers and feeling less closeness with friends among Norwegian youths (Sletten, 2010), and lower friendship quality in China (Ge and Wang, 2019). Two Swedish studies utilizing register data on household income have tested associations with self-reported number of friends (Olsson, 2007) and received in-class friendship nominations (Hjalmarsson and Mood, 2015). Although both these studies found that lower household income was associated with fewer self-reported and received friendship nominations, the strength of these associations were modest and attenuated when other sociodemographic factors, such as immigrant background, were controlled for. However, the cross-sectional designs and the omission of the network structure in these latter studies render the insights limited, as failure to control for endogenous network processes can lead to an overestimation of the importance of household income.

Endogenous network processes have the potential to amplify tendencies of lower friendship formation among poorer youths. While it is beyond the scope of this paper to hypothesize dynamics for all likely processes, we will do this in exemplary form for two basic effects: transitivity and popularity – common features in friendship networks. Transitivity is the tendency for individuals to be friends with the friends of their friends. This increased likelihood for common friends to interact with each other has been explained by the opportunity and maintenance costs (Simmel, 1950; Granovetter, 1973) as well as the tendency of individuals to view friends of their friends more positively (Heider, 1946). Again, if poorer individuals have fewer friends to begin with, opportunities to meet friends of friends are fewer, too. Lastly, the principle that popularity is attractive is a central process in friendship networks: It describes the tendency that those who have many friends, will make even more friends over time than those who have comparably fewer friends. If poorer students have fewer friends, this is less likely to happen. Overall, transitivity and popularity both have the potential to amplify differences in number of friends, by disproportionately creating more friends for those who initially have more. Notably, these processes are independent of individual attributes such as economic background. They apply to all individuals in a context but have the potential to work to the disadvantage of those who are already integrated to a lesser extent. To understand the direct impact of the economic situation on friendship integration, it is therefore important to control for these (and similar) processes in the analysis.

2.2. Friendship formation in the economic context

Although economic resources in absolute terms are likely to matter for youth's peer relationships, friendship formation often takes place within the social context of the school, and economic positioning in comparison to one's classmates, is likely to be of importance (Hjalmarsson, 2018; Hjalmarsson and Mood, 2015). We argue that there are

two main ways in which the relative economic position of individuals matters for friendship formation: demographic marginalization and income rank.

Demographic marginalization considers how individuals' characteristics align with the normative characteristics within a social context (Benner and Wang, 2014; Crosnoe, 2009). This perspective argues that being in social contexts with few peers who share one's social background has detrimental socioemotional and educational consequences, due to a lack of "fitting in" (Benner and Wang, 2014). Accordingly, studies have found that socioeconomically disadvantaged students, in school settings with fewer same-demographic peers, tend to report less peer acceptance, school belonging, and emotional well-being, and have lower grades and educational attainment than those in settings with a larger representation of disadvantaged youths (Benner and Wang, 2014; Crosnoe, 2009). Yet, although social integration is posited to be a key mechanism linking demographic marginalization to detrimental student outcomes, the associations between economic positioning and friendship formation have not previously been examined.

Greater demographic marginalization may deteriorate poorer students' structural opportunities for forming friendship ties, as socializing opportunities are more restricted when the economic resources of classmates tend to be higher, due to costly social activities being more normative. Additionally, youths from lower income households may also be less often considered as friends in classes with many students from higher income households, because social acceptance is less likely for youths who are perceived as deviating from, rather than aligning with the group norm (e.g., Boivin et al., 1995).

The second conceptualization of relative household income refers to one's income rank within a local context, such as the classroom. According to this income rank perspective, having fewer resources relative to peers confers lower status irrespective of one's resources in absolute terms (Boyce et al., 2010; Hounkpatin et al., 2015). Empirical findings indicate that in addition to (or sometimes rather than) absolute economic resources, a progressively lower income rank is related to lower mental and physical health and life satisfaction in adults (Boyce et al., 2010; Hounkpatin et al., 2015), and to internalizing problems and externalizing problems in adolescents (Elgar et al., 2013; Garratt et al., 2017). Yet, to our knowledge, no previous studies have examined the role of income rank in adolescents' friendship formation, over and above that of absolute income.

Furthermore, the low status of students in the lower ranks of a classroom's income distribution make them a less attractive friendship choice for classmates. At the same time, awareness of one's position in the social hierarchy may make lower-ranked youths more withdrawn or anxious, hampering their ability or inclination to make or maintain friendships. A lower income rank may also hamper youths' opportunities to participate in social activities if normative social activities are more expensive in schools with relatively wealthier peers, even if youths with a low income rank in such schools are not poor in absolute terms. In other words, having a lower income rank within the school-class context may bear negative consequences for friendship formation, beyond the effects lower absolute income.

3. This study

The aim of this study is to improve our understanding of why students with few economic resources experience difficulties in social integration at school, and if school composition regarding family income functions as an important contextual factor in these processes. As discussed above, there are several theoretical explanations as to why students from a lower economic background might have fewer friends. Empirical studies have provided cross-sectional evidence supporting this theory. Our study builds on this by testing more rigorously the effect of individual economic background on friendship formation through the consideration of endogenous network processes, and by considering the individual's relative economic position.

This requires a sophisticated analytical method that can simultaneously examine a students' own tendencies and the tendencies that classmates have towards a student. In doing so, we must disentangle effects of household income from effects of correlating individual characteristics (such as immigrant background), as well as effects relating to structural network processes endogenous to the relational system. For instance, if youths from lower income households occupy a comparatively isolated position in friendship networks in their school class, their situation could deteriorate over time due to processes unrelated to household income, such as not benefiting from individuals' tendencies to reciprocate friendship ties, or to befriend friends' friends (Holland and Leinhardt, 1971). To tackle these empirical challenges, we extend previous research on this issue by utilizing Stochastic Actor Oriented Models (SAOMs).

At the individual level, we expect classmates to be less likely to establish and maintain friendship ties with students with lower household income than with students with higher household income (**Hypothesis 1a**). At the same time, we also expect that students from lower income households are themselves less likely to establish and maintain friendship ties with classmates than students with higher household income (**Hypothesis 1b**).

At the contextual level, as the social environment in which friendship formation occurs may be important, we test how two theoretical frameworks of relative income are associated with the social dynamics in school friendship networks. Following the arguments of demographic marginalization, we test whether the negative associations between lower income and students' integration in friendship networks will be stronger in classes with a higher average household income (**Hypothesis 2**). Following the income rank perspective, we test whether students with a lower income rank within their school class are less likely to establish and maintain friendship ties with classmates, and whether classmates are less likely to establish and maintain friendship ties with students with a lower income rank (**Hypothesis 3**).

It is important to consider that links between economic background and friendship development may be confounded by other sociodemographic characteristics that often overlap with household income and also relate to peer relationships. For instance, the cultural and cognitive resources reflected by higher parental education may also contribute to friendship formation. Furthermore, immigrant background may confound associations between economic resources and friendship formation, as immigrant parents on average have lower income than parents from the majority population in Sweden and other European countries (Alba and Foner, 2015; Dustmann and Frattini, 2013). Although, previous social network studies suggest that ethnic minority youths are not necessarily less active in making friends than ethnic majority youths (Rambaran et al., 2015; Stark et al., 2017), social marginalization of immigrant youths seems to occur, particularly in schools with fewer immigrants (Plenty and Jonsson, 2017). In addition, parental separation is a risk factor for emotional and behavioral problems (Amato, 2010) that could negatively impact friendship development, and separation rates are higher in lower socioeconomic status families (Karney, 2021). To distinguish the associations of household income from these potentially confounding sociodemographic factors, the analyses will therefore control for parental education, immigrant background and family structure.

4. Method

4.1. Data

Data was drawn from the Swedish part of the Children of Immigrants Longitudinal Survey in Four European Countries (CILS4EU). The project was designed to examine the social, cultural and structural integration of adolescents in Europe. Statistics Sweden, the Swedish government statistics agency, collected the data using a two-step stratified cluster sampling approach. Schools across Sweden were randomly selected,

over-sampling immigrant-dense schools. Within each school, two randomly drawn 8th grade classes were selected, and all pupils in them were invited to participate. The current study used data from the first (winter 2010-spring 2011) and second (winter 2011-spring 2012) wave of data collection. Participants completed sociometric nominations and a self-report questionnaire during lesson time at wave 1 and then again approximately one-year later at wave 2 while in grade 9. Overall participation rates for the wave 1 sociometric and self-report questionnaires were 65.3% and 62.3%, whilst participation rates for the wave 2 sociometric and self-report questionnaires were 58.9% and 57.4%.²

In Sweden, students in grade 8 will have normally been in the same class for 1 year or more prior to data collection (Holmlund and Böhlmark, 2019) and attend nearly all lessons together until the completion of grade 9. Thus, these school classes represent a key social context for the students. Informed consent was obtained from all participants and their parents. Students were informed that participation was voluntary and that their responses were anonymous. Parents also completed postal questionnaires. Further details on the study design are described in Kalter et al. (2018) and a complete list of variables at www.cils4.eu. Survey data is available at www.gesis.org (ZA5353 data file). Information on household income, parental education, family structure and age of immigration was also drawn from government tax, immigration and education population administrative records (register data) held by Statistics Sweden in 2010.

Of the 251 classes in 129 schools participating at wave 1, 16 were excluded from the analyses due to the data requirements of the SAOM framework (e.g., we removed classes changing completely in terms of student composition between waves), leaving 235 classes ($n = 4787$, m age = 14.65, 51% girls, 33% migration background) in the analytical sample. (Network) statistics on both the full and the analytical sample revealed no substantive differences (details provided in the [Supplementary material](#)).

Item non-response on the network questions, furthermore, was dealt with by our Bayesian analysis method through imputing network ties from respondents with missing network data at either wave by draws from the full conditional posterior given everything else. This method should lead to consistent estimation under the assumption of Missing At Random (MAR) (Bright, Koskinen and Malm, 2019). Item non-response on other study variables was so low that it should not bias effects (Zandberg and Huisman, 2019).

4.2. Measures

Descriptive statistics of study variables are found in section S1 of the [Supplementary material](#).

4.2.1. Friendship nominations

At waves 1 and 2, students were asked “Who are your best friends in class?” A roster listing the names of all students in the class was provided and they could nominate up to five classmates. Students absent on the date of data collection were included on the roster (i.e., participating students could nominate all classmates). Within-classroom friendship networks were created on the basis of these nominations.

4.2.2. Household income

Household income represented the total disposable household income (income from all sources net of taxes) of participants’ registered guardians. If guardians lived in different households, the average of

their disposable household incomes was used. Straightforward effect size indicators are not available for multilevel SAOMs (Ripley et al., 2022). Therefore, a decision on the most appropriate operationalization of household income was based on substantive grounds pre-analysis. We operationalized *absolute household income* by calculating quintiles across the wave 1 gross sample, and operationalized *household income rank* quintiles within each school class. Previous studies using the CILS4EU data have shown that income quintiles identify important economic gradients in youths’ social, emotional and behavioral adjustment (e.g., Hjalmarsson and Mood, 2015; Plenty, 2018; Plenty and Mood, 2016), and compensate for the skewed distribution of household income. Using quintiles also enabled an intuitive test of hypothesis three by simultaneously estimating effects of measures of *household income rank* and *absolute household income* that were not perfectly collinear (as would be the case if using continuous scores of real income). Alternative versions of household income were tested in robustness checking: a continuous and a dichotomous (distinguishing the lowest two quintiles from higher quintiles).

4.2.3. Average classroom income

This was operationalized as the average absolute household income quintile across students from the same school class.

4.2.4. Control variables

Parental Education. Parents’ educational attainment records included six categories ranging from less than secondary education to post-graduate university studies. These values were dominance-coded (Erikson, 1984) to represent the highest level of education attained by participants’ parents (scores ranging from 1 to 6).

Immigrant Background. Data on immigrant background came from student-reports, complemented with parent-reports or population register information in the case of student non-response. Participants were categorized as majority (0) if they were the biological or adoptive child of at least one Swedish-born parent, all others were defined as having immigrant background (1). We also constructed a variable representing participants’ region of origin to control for ethnic homophily. This included the following grouping: Sweden, European & Western, Russia/Former USSR, Balkans, Middle Eastern, African, Asian and Latin/South American regions.

Family Structure. A dichotomous variable distinguished between adolescents whose registered guardians resided in the same household (1) compared to alternative family forms (0).

4.3. Analysis

To set the scene, we first used descriptive statistics to examine if the number of friendship nominations students received and sent at wave 1 varied according to household income. Then, to examine how household income affected within-classroom friendship network dynamics, we applied longitudinal social network models using stochastic actor-oriented models (“SAOMs”, Snijders et al., 2010). These models aim to understand what drives change and stability in a social network over time. In short, these models test whether endogenous network effects (e.g., the tendency to reciprocate a tie) as well as characteristics of actors (e.g., the tendency actors from higher income groups to send more ties) play a role in the evolution of a particular network.

Having a multinomial logit model at its core, SAOMs decompose the assumed chain of network change between two times points into so-called mini-steps, in which a randomly chosen actor gets the chance to change their local network configuration (i.e., create or terminate a tie). If and in which way the actor changes their ties is simulated based on the so-called objective function that is specified by the researcher. It contains theoretically assumed tendencies, so-called effects, for example the tendency to reciprocate ties or the tendency of popular individuals to attract more ties. The SAOM tests whether these tendencies contribute significantly to the observed network change. The researcher can also

² In line with recommendations from the American Association for Public Opinion Research (The American Association for Public Opinion Research, 2016), we provide separate participation rates for each individual questionnaire that we employed in this study. The reported response rates are maximum response rates (i.e., “RR6”) (The American Association for Public Opinion Research, 2016, p. 62).

specify effects that relate to individual characteristics, such as household income.

Since our sample consists of many within-class friendship networks, we specified a multilevel SAOM (Ripley et al., 2022; Snijders and Koskinen, 2012), which is analogous to the hierarchical linear model (Snijders and Bosker, 2012). The multilevel SAOM uses Bayesian estimation and assumes a normal distribution of parameters across networks (Koskinen and Snijders, 2007). This allowed us to analyse network processes in all classrooms simultaneously and thus identify the tendencies that are present in the networks on average (Koskinen & Snijders 2022). The analyses were implemented in R (version 3.2.2), using the package *RSienaTest 1.2–19* and estimations were performed on a large computer cluster. Unlike in the single-network SAOM, no convergence estimates for the individual parameters are given. We followed the *Manual for RSiena* (Ripley et al., 2022) as well as Koskinen & Snijders (2022) and assessed convergence by two means. First, we visually inspected the estimation trace plots, which indicated good convergence of all models (see Figs. S1 to S3 in the [Supplementary Material](#)). Second, we calculated a formal convergence test (Gelman et al., 2014; Snijders and Koskinen, 2012) that confirmed this evaluation.

To test the three hypotheses, three different multilevel SAOMs were specified. All models contained controls for endogenous network processes, as well as controls for friendship formation based on gender, immigrant background, parental education, and family structure, including controls for homophily based on each of these student characteristics. We also controlled for the size of each network (i.e., the class size) because endogenous network processes depend to some extent on the number of actors in the network. The interpretation of this is analogous to a control in a regression, i.e. when interpreting a particular effect, such as one relating to a hypothesis, the estimated statistical effect is “net off” all others in the model.

In the three SAOMs, we specify so-called *effects* that directly test our hypotheses; in the estimation, the SAOM evaluates whether a particular effect contributes significantly to the evolution of the networks in our sample. Hypotheses 1a and 1b, on the effects of absolute income, were tested in Model 1 by including two effects named *absolute income alter* and *absolute income ego*. *Absolute income alter* represented the tendency for students from higher income quintiles to receive more friendship ties. *Absolute income ego* analogously represented the tendency for students from higher income quintiles to send or maintain more friendship ties than those in lower quintiles. Positive coefficients would indicate that classmates were less likely to establish or maintain friendships with adolescents with lower household income, and that adolescents with lower household income were less likely to establish and maintain friendships than adolescents with higher household income, thus supporting hypotheses H1a and H1b. To test hypothesis 2 on demographic marginalization, Model 2 added *average classroom income quintile*, and interacted this with *absolute income alter* and *ego*, respectively. Positive coefficients for the two interaction effects in addition to positive coefficients for the *absolute income* main effects would indicate that the effects of income on integration in friendship networks are stronger in classes with higher average household income. To test hypothesis 3 on income rank, effects of *income rank alter* (the tendency for students with higher in-class income ranks to receive more ties) and *ego* (the tendency for students with higher in-class income rank to send or maintain more friendship ties than those with lower income rank) were added to the model. Positive coefficients for the income rank effects would indicate that having a lower income rank among classmates impedes friendship formation or maintenance beyond the effects of having lower absolute household income.

4.3.1. Follow-up simulations

In the multilevel SAOMs, the parameters of interest pertain to the effect of household income on tendencies of sending and receiving friendship ties within class, everything else equal. To better understand

the impact of these effects on the number of friendship nominations youths with different household incomes send and receive over time, we extended our analysis by simulations, as described in Block (2018). To this end, we conducted two sets of simulations. In the first, we used the parameter estimates from our multilevel SAOM to simulate forward from wave 1 the likely change of each of our within-class friendship networks. We conducted 1000 simulations per within-class friendship network so that we can achieve an adequate distribution from which to take descriptives for comparison.

The second set of analyses were identical to the first, except that we set all income effects (income alter, ego, and homophily) to zero. This way, we simulate how the networks from wave 1 would evolve if parental income did not matter for friendship nominations. We then contrasted the average number of predicted friendship nominations for different household income sub-groups under both scenarios. Thus, the simulations allowed us to compare income-related gaps in number of sent and received friendship nominations in our estimated model, to a model where the effects of household income were zero (i.e., were completely confounded). To account for differences across friendship networks in density and amount of change, separate outdegree and rate parameters were used for each friendship network in both sets of simulations (Block, 2018).

5. Results

5.1. Bivariate associations between friendship nominations and household income at wave 1

Prior to the main analyses, we begin by presenting the descriptive statistics for students' number of friendship nominations at wave 1 according to household income in order to identify if any income differences existed at baseline. Figs. 1 and 2 show the distribution of received (Fig. 1) and given (Fig. 2) friendship nominations at wave 1 by household income quintile. In addition, both Figures provide the mean and standard deviation of received(sent) friendship nominations by household quintile in writing. In both figures, the contrast between students in the lowest two and the highest three quintiles is most noteworthy. Students in the lowest two quintiles received fewer friendship nominations and sent fewer friendship nominations on average than students in the higher income quintiles, although differences are modest in size.

Furthermore, preliminary analyses showed substantial within-class variation in household income, confirming the suitability of the data for examining effects of within-class income differences on friendship nomination dynamics (i.e., H1a, H1b, H3). Most classes comprised students from all five income quintiles (84.20%) and all other classes included students from four or three different income quintiles (14.58% and 1.22%, respectively). Also, the average income varied substantially between classes, with the average classroom quintile ranging between 1.59 and 4.56 ($ICC = .17$), confirming the suitability of the data for comparing contextual effects between classes (i.e., H2). Therefore, we conducted the multilevel SAOMs to which we now turn.

5.2. Estimating friendship network dynamics with multilevel SAOMs

To examine the development of friendship networks across the two waves, multilevel SAOMs were performed. Table 1 presents the key findings (see section S3 in the [Supplementary Material](#) for full results). In Model 1 both *absolute income alter* and *absolute income ego* showed significant³ positive coefficients, which indicates that students were less likely to establish or maintain friendship ties with students from lower income quintiles, and that students from lower income quintiles were themselves less likely to establish or maintain friendship ties between

³ To improve readability, we use frequentist terminology when discussing our results, although the models we apply in this paper use a Bayesian estimation.

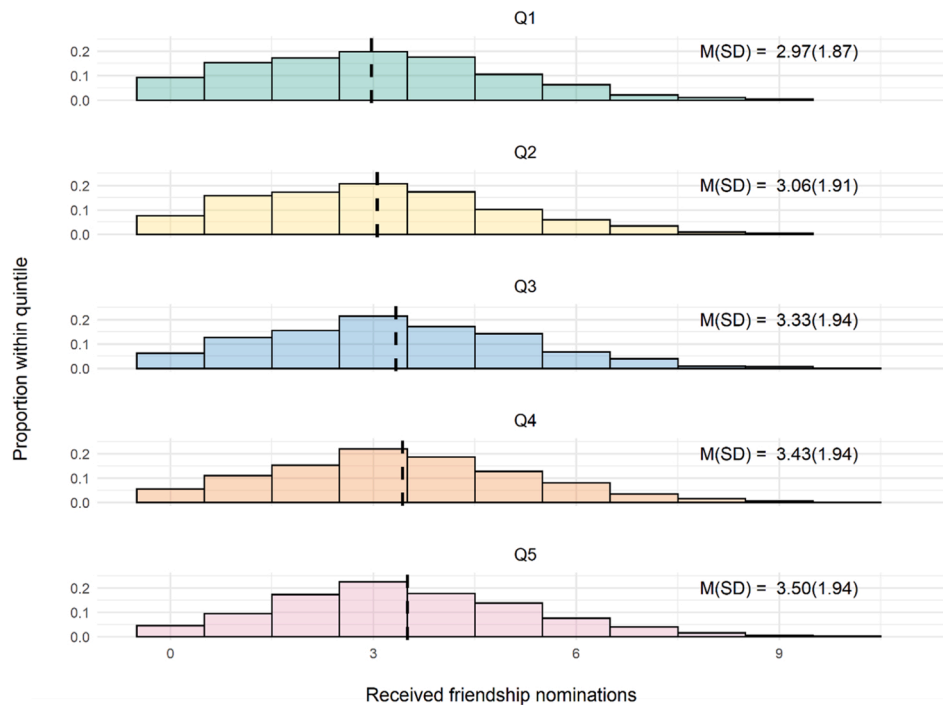


Fig. 1. Received friendship nominations at wave 1 by absolute income quintile. Note. Dashed vertical lines depict means.

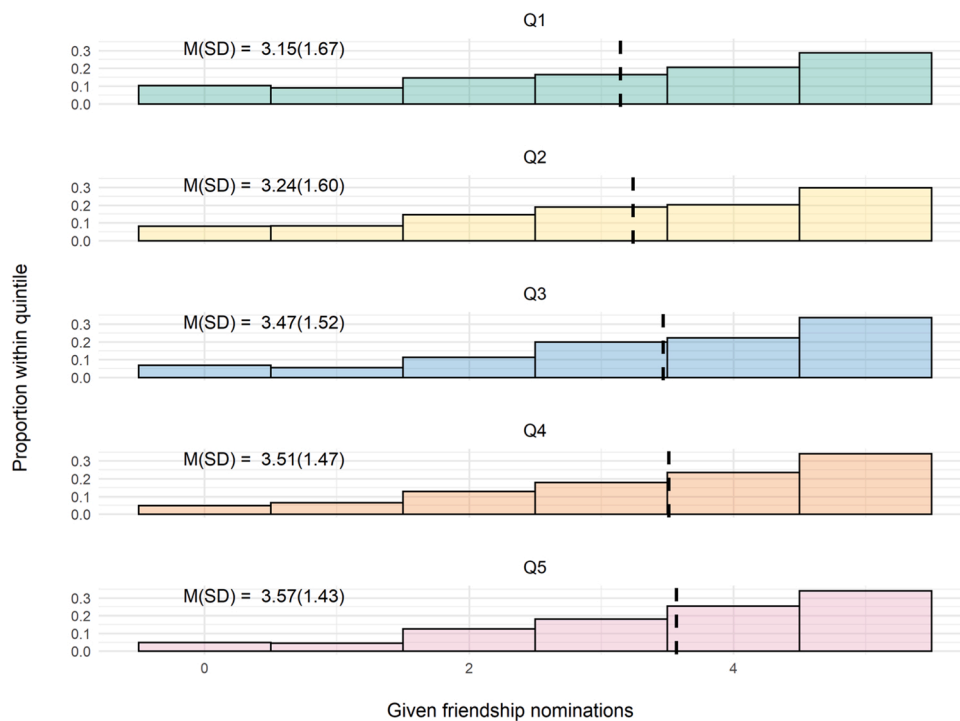


Fig. 2. Sent friendship nominations at wave 1 by absolute income quintile. Note. Dashed vertical lines depict means.

study waves. We thus found evidence for both hypotheses 1a and 1b. No significant homophily effect with regard to household income was detected.

Model 2 shows that the interaction effects for *absolute income alter* and *ego* with average class-level income were both non-significant, whilst the main effects remained significant. Thus, we did not find support for hypothesis 2 about demographic marginalization. Model 3 includes the effects of both absolute income and income rank on

friendship nomination dynamics. As no significant effects of income rank were found, hypothesis 3 was not supported.

5.3. Follow-up simulations

Our analysis was then extended with counterfactual simulations to illustrate the extent to which the effects of income on friendship dynamics might lead to concrete differences in the number of given and

Table 1
Results from multilevel SAOMs.

Effect	Model 1			Model 2			Model 3		
	posterior mean	posterior p-value	posterior SD	posterior mean	posterior p-value	posterior SD	posterior mean	posterior p-value	posterior SD
Alter’s absolute income	0.034	> 0.99	(0.014)	0.036	0.99	(0.015)	0.039	0.89	(0.031)
Ego’s absolute income	0.06	> 0.99	(0.017)	0.058	> 0.99	(0.019)	0.071	0.97	(0.035)
Absolute income homophily	0.06	0.78	(0.077)	0.04	0.69	(0.085)	−0.010	0.47	(0.125)
Average absolute income in class				−0.042	0.45	(0.255)			
Alter’s absolute income × average absolute income in class				0.005	0.58	(0.024)			
Ego’s absolute income × average absolute income in class				0.023	0.78	(0.030)			
Alter’s income rank							0.003	0.55	(0.027)
Ego’s income rank							−0.006	0.40	(0.028)
Income rank homophily							0.071	0.73	(0.117)

Notes. Posterior p-value: estimated posterior probability that the parameter is >0. Posterior p-values can be interpreted in frequentist terms; e.g. 0.99 corresponds to a 1% significance level for estimated parameters > 0, and 0.01 corresponds to a 1% significance level for estimated parameters <0. All models control for endogenous network effects as well as friendship nomination dynamics depending on family structure, parental education, immigrant background, region of origin and gender. The full results table can be found in Tables S.5 (Model 1), S.6 (Model 2), and S.7 (Model 3) in the Supplementary material.

received friendship nominations over time. We do so using Model 1 only, given that Models 2 and 3 did not show support for the corresponding hypotheses. In a baseline model, we simulate how the networks from wave 1 would evolve using the Model 1 parameter estimates as input for the simulation. In a counterfactual model, we repeated this simulation whilst setting all effects related to parental income (income ego, income alter, income homophily) to zero. These simulations compared the average number of received and sent friendship nominations among students from the lowest two absolute income quintiles to students with higher household income, as wave 1 differences in the mean number of friendship nominations were largest between these groups (see Figs. 1 and 2).

Table 2 summarizes the outcome of these simulations. The baseline model leads to a gap between students from low income versus higher income households of approximately half a friendship tie for both received and sent friendship nominations, whereas this gap corresponds to about one third of a friendship tie in the counterfactual model. This indicates that about 1/3rd of the “friendship nomination gaps” were explained by effects pertaining to household income, whereas the remaining estimated gap is brought about by confounding and correlated factors. When interpreted as number of friendship nominations, approximately 1/6th of a friendship tie (1/2 minus 1/3) was attributable to income-related tendencies.

5.4. Robustness checks

Three sets of checks were performed to test the robustness of our findings. We tested whether the operationalizations of household income and classroom composition produced null-findings with regard to hypothesis 2, whether a more elaborate model specification of models 1 and 3 led to different conclusions, and whether a different operationalization of household income would have led to substantially different outcomes of our follow-up simulation.

Table 2
Friendship gap simulation results for Model 1.

	Friendship nomination gap baseline model	Friendship nomination gap counterfactual model	Explained Difference
Received nominations	−0.563	−0.381	0.182
Sent nominations	−0.479	−0.312	0.167

Note. Friendship nomination gap = Number of friendship nominations of low-income youths (lowest two quintiles) – number of friendship nominations of higher income youths (highest three quintiles).

It is possible that the null-findings for demographic marginalization (H2) were an artefact of our operationalization of household income and classroom composition. We therefore tested numerous alternative operationalizations of the student and classroom-level measures of absolute income, and subsequent interaction terms. In a series of analyses replicating Model 2, measures of student-level household income as continuous and as dichotomous (distinguishing the lowest two quintiles from higher quintiles) were tested, and each measure was interacted with either classroom-level average income or the proportion of low-income students. Each of these robustness checks for Model 2 returned non-significant interactions, corroborating our null-finding with regard to Hypothesis 2.

The main analyses estimated the effects of household income on friendship nominations using a default 3-parameter specification (alter, ego, and homophily). Snijders and Lomi (2019) advocate a more elaborate five-parameter specification for modelling selection based on attributes (such as household income) in positively valenced social networks. To ensure that our 3-parameter model specification used in the main analyses did not miss important mechanisms, Models 1 and 3 were re-estimated using the five-parameter specification. These results were not more informative than our main analyses (see section S4 in the Supplementary material for more details). We therefore chose to present the more parsimonious three-parameter model.

Lastly, follow-up simulations contrasted friendship nomination gaps between students from the lowest two and the highest three quintiles, yet the underlying SAOM assumed a constant effect of household income across all income quintiles. To examine if this mismatch affected our conclusions, simulations were re-estimated based on a SAOM that used a dichotomous measure of household income (lowest two quintiles vs. highest three quintiles). This re-analysis resulted in only slightly larger friendship nomination gaps than the ones presented above, suggesting that our operationalization of household income using quintiles did not notably underestimate the household income effects.

6. Discussion

Using a large sample of Swedish youths and combining sociometric nominations with register data on sociodemographic characteristics, this study examined if and how household income impacted the social dynamics underlying friendship formation in school classes. We hypothesized that across time, poorer youths may be less often nominated as friends by their classmates but may also be less active in establishing or maintaining friendship ties than their wealthier peers. Given that schools are a key social environment for youth, we furthermore examined the role of relative income according to two theoretical frameworks. First, in line with demographic marginalization, we argued that

these mechanisms would be strengthened in classrooms with a lower representation of economically disadvantaged students. Second, consistent with the income rank literature, we also expected lower household income relative to classmates to impede one's integration in friendship networks, beyond the effects of absolute income.

The main contributions of this study were threefold. First, we extend earlier cross-sectional findings that youths with fewer economic resources receive fewer friendship nominations and report having fewer friends at school than their more economically advantaged classmates (Hjalmarsson, 2015; Olsson, 2007) by demonstrating how household income impacts within-classroom friendship formation dynamics: Across time, youths from lower income households were less often nominated as friends by their classmates, and also obtained or maintained friendship nominations less often than youths with higher household income. Thus, poorer youths appear to be less socially integrated at the end of secondary school because they tend to be overlooked by others, but also because they see themselves as less connected to classmates. We argued in the front-end of the paper that mechanisms related to the opportunity structure and utility considerations could bring about these dynamics. Therefore, future research should be designed so that these mechanisms can be tested explicitly.

Importantly, these links with household income were independent of potential confounders, such as immigrant background, and from other dimensions of socioeconomic positioning, such as parental education and parental separation. Although the past decade has seen a rich literature develop on the social integration of immigrant background and ethnic minority students, a corresponding understanding of how economic factors may shape youth's social relationships is lacking. The current findings illustrate that despite often overlapping with such characteristics, economic disadvantage is a risk factor in itself. Supporting the social integration of low-income students should be taken seriously by policy and adults positioned to guide youth's social interactions and activities.

A second contribution of this study was that follow-up simulations allowed us to estimate how these dynamics contributed to the integration of lower versus higher income youths within classroom friendship networks. These simulations indicated that $\sim 1/6$ th of a friendship tie was attributable to the effects of household income, which represents a substantively meaningful yet modest effect. However, our study captured friendship formation between grades 8 and 9 only, whilst these processes are likely to have accumulated throughout one's school years, as young children are already sensitive to wealth cues (Shutts et al., 2016). The question then is how large this accumulative effect of household income on integration in friendship networks at school is. We could only speculate. Future studies on younger age groups and that follow students across longer periods of time could gain a better picture of the incremental influence of income across the school years. Nevertheless, by using simulations, our study is the first to provide a concrete indication of the substantive implications of household income on friendship formation dynamics at school. This provides an important empirical evidence base, leaving an important avenue for future research to track at which ages these income differences in friendship formation arise and if they might function as mechanisms by which young people from low socioeconomic backgrounds become at greater risk of poorer mental well-being (Devenish et al., 2017; Huisman et al., 2010; Marçal, 2020) or school outcomes (Conger et al., 2012).

The third contribution of this study was to demonstrate that relative income was not related to students' friendship formation. The tendencies for youths from a lower income background to be less often selected for forming or maintaining friendship ties and to less often form or maintain friendship ties themselves were each independent of the school class context. That is, as the average income of the school class did not moderate these tendencies, we found no support for demographic marginalization. Low-income students did not have worse social integration in classes where their household income was less aligned with the normative level among their classmates. In addition, as

students' income rank did not impact the formation and maintenance of friendship ties over and above the effects of absolute income background, we also found no support for the income rank perspectives. Instead, youths with smaller absolute economic resources were less selected as a friend across all contexts. This finding is in line with earlier work concluding that youths award higher social status to attributes signaling greater wealth, regardless of their own economic background (Elliott and Leonard, 2004; Shutts et al., 2016).

Previous studies supporting demographic marginalization in terms of socioeconomic background, have drawn on U.S. samples and self-reports of peer acceptance, school belonging, or emotional well-being (Benner and Wang, 2014; Crosnoe, 2009). The current findings might differ due to at least three factors: the nature of our measures (i.e., friendship formation obtained through sociometric nominations); the sample comprising students in Sweden; and the focus on household income instead of parental education and occupational status (Benner and Wang, 2014). Not necessarily in conflict with previous findings - demographic marginalization may occur for subjective experiences of/reflections on social integration, but we find it doesn't show up in measures more closely tapping into behaviours. In addition, although lower income rank has previously been linked to internalizing and externalizing problems (Elgar et al., 2013; Garratt et al., 2017), we find that classmates' household income does not appear to function as a meaningful comparison group for adolescents' friendship formation.

A speculative explanatory mechanism for the null findings for relative income could be that youths who are poor in absolute terms suffer from greater exposure to economic stress and other family-related psychosocial stressors, leading to a higher prevalence of emotional and behavioral problems (Devenish et al., 2017). From a utility perspective, this may make youths poor in absolute terms a less attractive friendship choice for classmates, more than youths who stand low in the classroom income distribution but aren't poor in absolute terms. Future research should test which behavioral and attitude mechanisms underly the link between household income and integration in friendship networks at school. In addition, Sweden is a social democratic welfare state with high levels of income redistribution and a high standard of living (Socialstyrelsen, 2010) where few children grow up in absolute poverty (Mood and Jonsson, 2016). Replications in other countries are needed to test if relative income plays a greater role in integration at school in less egalitarian countries, such as the US.

A more minor, yet noteworthy contribution was that classmates with similar household income did not have an increased likelihood of establishing or maintaining friendship ties with each other. This was despite the omnipresence of trait homophily in the friendship formation literature, particularly in relation to sociodemographic characteristics such as gender or immigrant status. This finding may be because both richer and poorer adolescents admire indicators of wealth and thus seek friendships with economically advantaged peers (Elliott and Leonard, 2004; Shutts et al., 2016). Furthermore, our results that signal a lack of attraction to similar others is in line with other studies showing that homophily mechanisms are not at play for traits that are generally not esteemed in the peer context (Dijkstra et al., 2013).

A limitation worth discussing concerns the delineation of our network data. Respondents could nominate friends from their school class, which only partly captures their social integration at school. (Birkeland et al., 2014; Raabe, 2019; Ream and Rumberger, 2008; Weyns et al., 2018). Nevertheless, as Swedish students remain in the same class for a number of consecutive years and attend nearly all lessons with the same classmates, it undoubtedly captured a central social network for our participants. Furthermore, in an ego-network section of the CILS4EU survey where respondents were asked to provide details on their five best friends overall, 58% of these friends were classmates. Nonetheless, testing if and how delineating school friendship networks at different levels, such as the grade or school level, would modify our findings, could be a valuable avenue for future research. However, maintaining friendship ties with peers from different classrooms may

require more effort than maintaining friendship ties within the same school class due to less structural opportunities for interaction (Leszczynsky and Pink, 2015). Consequently, befriending out-of-classroom peers may require a relationship to be perceived as particularly attractive or beneficial. This would strengthen utility-driven mechanisms leading low-income youths to be perceived as unattractive as a friend. Thus, if the effects of economic background on integration in friendship networks are stronger at the grade or school level than at the class level, the current study's focus on school classes might underestimate the broader social costs of coming from a poorer household. On the other hand, students from lower income households could aim to compensate for being less well integrated in in-class friendship networks by establishing cross-classroom friendship ties to a higher extent than students from higher income households. However, robustness analyses using the five overall best friend ego-networks found that students from the lowest two household income quintiles did not nominate more cross-classroom schoolmates among their five overall best friends than students from higher income backgrounds (difference = $-.01$, 95% CI $[-.08, .05]$).

A second limitation concerns to what extent the effects detected in our study correspond with students' lived experiences of friendship dynamics in class. Qualitative interviews with youths could complement the current findings by presenting a picture of students' perspectives of the role that economic resources play in friendship networks in school classes. For example, we argued for several processes as potential mediators of the link between household income and friendship development (e.g., being limited in participating in social activities and more school changes, social status considerations, behavioral problems due to economic stress). Qualitative work could elucidate which of these processes youths perceive as having the strongest impact on friendship networks at school.

Future research should also explore the long-term implications of our study findings. Although peer relationships at school have been linked to adult health (e.g., Östberg and Modin, 2008), wellbeing (e.g., Mrug et al., 2012) and wealth (Wolke et al., 2013), the mechanisms behind these long-term associations remain poorly understood. A potential avenue for future research could be to study if and how an increased risk of social isolation at school is part of a developmental cascade (Masten and Cicchetti, 2010) linking economic background to inequalities later in life, in particular as size of friendship networks in adulthood is linked to other indicators of social capital (Stauder, 2014).

7. Conclusion

Coming from a lower income household hampers the integration of Swedish adolescents in friendship networks in school classes. Over a one-year observation period, youths from lower quintiles of the absolute household income distribution were less able to attract new or maintain existing friendship nominations than their richer classmates. Moreover, these youths were less likely to establish and maintain friendships in class than youths with higher household income. Follow-up simulations indicated that these tendencies lead to meaningful differences in the number of friendship ties youths have in class. Furthermore, we did not find that these tendencies were attenuated in classrooms with lower average household income, nor that students' income rank in class had an effect over and above absolute income, implying that effects of household income on friendships in class are of a universal nature. Together, the findings of this study indicate that theories of relative income do not extend understanding of students' friendship formation beyond processes related to absolute income. In addition, this study suggests that the social integration of students from low-income households could be boosted by both promoting their agency in forming friendships and preventing exclusion by classmates.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the

online version at doi:10.1016/j.socnet.2023.12.003.

References

- Alba, R., Foner, N., 2015. *Strangers no More: Immigration and the Challenges of Integration in North America and Western Europe*. Princeton University Press, Princeton (NJ).
- Amato, P.R., 2010. Research on divorce: continuing trends and new developments. *J. Marriage Fam.* 72, 650–666. <https://doi.org/10.1111/j.1741-3737.2010.00723.x>.
- Benner, A.D., Wang, Y., 2014. Demographic marginalization, social integration, and adolescents' educational success. *J. Youth Adolesc.* 43, 1611–1627. <https://doi.org/10.1007/s10964-014-0151-6>.
- Birkeland, M.S., Breivik, K., Wold, B., 2014. Peer acceptance protects global self-esteem from negative effects of low closeness to parents during adolescence and early adulthood. *J. Youth Adolesc.* 43, 70–80. <https://doi.org/10.1007/s10964-013-9929-1>.
- Block, P., 2018. Network evolution and social situations. *Sociol. Sci.* 5, 402–431. <https://doi.org/10.15195/v5.a18>.
- Boivin, M., Dodge, K.A., Coie, J.D., 1995. Individual-group behavioral similarity and peer status in experimental play groups of boys: the social misfit revisited. *J. Personal. Soc. Psychol.* 69, 269–279. <https://doi.org/10.1037/0022-3514.69.2.269>.
- Boyce, C.J., Brown, G.D.A., Moore, S.C., 2010. Money and happiness: rank of income, not income, affects life satisfaction. *Psychol. Sci.* 21, 471–475. <https://doi.org/10.1177/0956797610362671>.
- Bradley, R.H., Corwyn, C.F., 2002. Socioeconomic status and child development. *Annu. Rev. Psychol.* 53, 371–399. <https://doi.org/10.1146/annurev.psych.53.100901.135233>.
- Bright, D., Koskinen, J., Malm, A., 2019. Illicit network dynamics: The formation and evolution of a drug trafficking network. *J. Quant. Criminol.* 35, 237–258. <https://doi.org/10.1007/s10940-018-9379-8>.
- Bukowski, W.M., Dirks, M., Persram, R.J., Wright, L., Infantino, E., 2020. Peer relations and socioeconomic status and inequality. *N. Dir. Child Adolesc. Dev.* 2020, 27–37. <https://doi.org/10.1002/cad.20381>.
- Conger, K.J., Martin, M.J., Reeb, B.T., Little, W.M., Craine, J.L., Shebloski, B., Conger, R. D., 2012. Economic hardship and its consequences across generations. In: Maholmes, V., King, R.B. (Eds.), *Oxford Library of Psychology. The Oxford Handbook of Poverty and Child Development*. Oxford University Press, Oxford, UK, pp. 37–53.
- Crosnoe, R., 2009. Low-income students and the socioeconomic composition of public high schools. *Am. Socio Rev.* 74, 709–730. <https://doi.org/10.1177/000312240907400502>.
- Devenish, B., Hooley, M., Mellor, D., 2017. The pathways between socioeconomic status and adolescent outcomes: a systematic review. *Am. J. Community Psychol.* 59, 219–238. <https://doi.org/10.1002/ajcp.12115>.
- Dijkstra, J.K., Cillessen, A.H.N., Borch, C., 2013. Popularity and adolescent friendship networks: selection and influence dynamics. *Dev. Psychol.* 49, 1242–1252. <https://doi.org/10.1037/a0030098>.
- Dustmann, C., Frattini, T., 2013. *Immigration: the European experience*. In: Card, D., Raphael, S. (Eds.), *Immigration, Poverty, and Socioeconomic Inequality*. Russell Sage Foundation, New York, pp. 423–456.
- Elgar, F.J., De Clercq, B., Schnohr, C.W., Bird, P., Pickett, K.E., Torsheim, T., Hofmann, F., Currie, C., 2013. Absolute and relative family affluence and psychosomatic symptoms in adolescents. *Soc. Sci. Med.* 91, 25–31. <https://doi.org/10.1016/j.socscimed.2013.04.030>.
- Elliott, R., Leonard, C., 2004. Peer pressure and poverty: exploring fashion brands and consumption symbolism among children of the 'British poor'. *J. Consum. Behav.* 3, 347–359. <https://doi.org/10.1002/cb.147>.
- Engzell, P., Jonsson, J.O., 2015. Estimating social and ethnic inequality in school surveys: biases from child misreporting and parent nonresponse. *Eur. Sociol. Rev.* 31, 312–325. <https://doi.org/10.1093/ESR/JCV005>.
- Erikson, R., 1984. Social class of men, women and families. *Sociology* 18, 500–514. <https://doi.org/10.1177/0038038584018004003>.
- Fjellborg, A.A., 2022. Residential mobility and spatial sorting in Stockholm 1990–2014: the changing importance of housing tenure and income. *Int. J. Hous. Policy* 22, 198–224. <https://doi.org/10.1080/19491247.2021.1893117>.
- Garratt, E.A., Chandola, T., Purdam, K., Wood, A.M., 2017. Income and social rank influence UK children's behavioral problems: a longitudinal analysis. *Child Dev.* 88, 1302–1320. <https://doi.org/10.1111/cdev.12649>.
- Ge, T., Wang, L., 2019. Multidimensional child poverty, social relationships and academic achievement of children in poor rural areas of China. *Child. Youth Serv. Rev.* 103, 209–217. <https://doi.org/10.1016/j.childyouth.2019.06.007>.
- Gelman, A., Carlin, J.B., Stern, H.S., Dunson, D.B., Vehtari, A., Rubin, D.B., 2014. *Bayesian Data Analysis, third ed.*. CRC Press.
- Granovetter, M.S., 1973. The strength of weak ties. *Am. J. Sociol.* 78, 1360–1380.
- Heider, F., 1946. Attitudes and cognitive organization. *J. Psychol.* 21, 107–112.
- Hjalmarsson, S., 2018. Poor kids? economic resources and adverse peer relations in a nationally representative sample of Swedish adolescents. *J. Youth Adolesc.* 47, 88–104. <https://doi.org/10.1007/s10964-017-0747-8>.
- Hjalmarsson, S., Mood, C., 2015. Do poorer youth have fewer friends? the role of household and child economic resources in adolescent school-class friendships. *Child. Youth Serv. Rev.* 57, 201–211. <https://doi.org/10.1016/j.CHILDYOUTH.2015.08.013>.
- Holland, P.W., Leinhardt, S., 1971. Transitivity in structural models of small groups. *Comp. Group Stud.* 2, 107–124. <https://doi.org/10.1177/104649647100200201>.

- Holmlund, H., Böhlmark, A., 2019. Does grade configuration matter? effects of school reorganisation on pupils' educational experience. *J. Urban Econ.* 109, 14–26. <https://doi.org/10.1016/j.jue.2018.11.004>.
- Hounkpatin, H.O., Wood, A.M., Brown, G.D.A., Dunn, G., 2015. Why does income relate to depressive symptoms? testing the income rank hypothesis longitudinally. *Soc. Indic. Res.* 124, 637–655. <https://doi.org/10.1007/s11205-014-0795-3>.
- Huisman, M., Araya, R., Lawlor, D.A., Ormel, J., Verhulst, F.C., Oldehinkel, A.J., 2010. Cognitive ability, parental socioeconomic position and internalising and externalising problems in adolescence: findings from two European cohort studies. *Eur. J. Epidemiol.* 25, 569–580. <https://doi.org/10.1007/s10654-010-9473-1>.
- Kalter, F., Jonsson, J., Van Tubergen, F., Heath, A., 2018. *Growing up in Diverse Europe. The Integration of the Children of Immigrants in England, Germany, Netherlands, and Sweden.* Oxford University Press, Germany, Netherlands, and Sweden.
- Karney, B.R., 2021. Socioeconomic status and intimate relationships. *Annu. Rev. Psychol.* 72, 1–24. <https://doi.org/10.1146/annurev-psych-051920-013658>.
- Koskinen, J.H., Snijders, T.A.B., 2007. Bayesian inference for dynamic social network data. *J. Stat. Plan. Inference* 137, 3930–3938. <https://doi.org/10.1016/j.jspi.2007.04.011>.
- Leszczensky, L., Pink, S., 2015. Ethnic segregation of friendship networks in school: testing a rational-choice argument of differences in ethnic homophily between classroom- and grade-level networks. *Soc. Netw.* 42, 18–26. <https://doi.org/10.1016/j.socnet.2015.02.002>.
- Marçal, K.E., 2020. Demographic and socioeconomic predictors of behavioral trajectories from age 3 to 15: a longitudinal mixed effects approach. *J. Child Fam. Stud.* 29, 1818–1832. <https://doi.org/10.1007/s10826-020-01710-8>.
- Masten, A.S., Cicchetti, D., 2010. Developmental cascades. *Dev. Psychopathol.* 22, 491–495. <https://doi.org/10.1017/S0954579410000222>.
- Mood, C., Jonsson, J.O., 2016. Trends in child poverty in Sweden: parental and child reports. *Child Indic. Res.* 9, 825–854. <https://doi.org/10.1007/s12187-015-9337-z>.
- Mrug, S., Brooke, B.S., Hoza, B., Gerdes, A.C., Hinshaw, S.P., Hechtman, L., Arnold, L.E., 2012. Peer rejection and friendships in children with attention-deficit/hyperactivity disorder: contributions to long-term outcomes. *J. Abnorm. Child Psychol.* 40, 1013–1026. <https://doi.org/10.1007/s10802-012-9610-2>.
- Olsson, E., 2007. The economic side of social relations: household poverty, adolescents' own resources and peer relations. *Eur. Sociol. Rev.* 23, 471–485. <https://doi.org/10.1093/ESR/JCM016>.
- Östberg, V., Modin, B., 2008. Status relations in school and their relevance for health in a life course perspective: findings from the Aberdeen children of the 1950's cohort study. *Soc. Sci. Med.* 66, 835–848. <https://doi.org/10.1016/j.socscimed.2007.10.018>.
- Plenty, S., 2018. Too much or too little? a short-term longitudinal study of youth's own economic resources and risk behaviour. *J. Adolesc.* 66, 21–30. <https://doi.org/10.1016/j.adolescence.2018.04.005>.
- Plenty, S., Jonsson, J.O., 2017. Social exclusion among peers: the role of immigrant status and classroom immigrant density. *J. Youth Adolesc.* 46, 1275–1288. <https://doi.org/10.1007/s10964-016-0564-5>.
- Plenty, S., Mood, C., 2016. Money, peers and parents: Social and economic aspects of inequality in youth wellbeing. *J. Youth Adolesc.* 45, 1294–1308. <https://doi.org/10.1007/s10964-016-0430-5>.
- Raabe, I.J., 2019. Social exclusion and school achievement: children of immigrants and children of natives in three European countries. *Child Indic. Res.* 12, 1003–1022. <https://doi.org/10.1007/s12187-018-9565-0>.
- Rambaran, J.A., Dijkstra, J.K., Munniksma, A., Cillessen, A.H.N., 2015. The development of adolescents' friendships and antipathies: a longitudinal multivariate network test of balance theory. *Soc. Netw.* 43, 162–176. <https://doi.org/10.1016/j.socnet.2015.05.003>.
- Ream, R.K., Rumberger, R.W., 2008. Student engagement, peer social capital, and school dropout among Mexican American and non-Latino white students. *Sociol. Educ.* 81, 109–139. <https://doi.org/10.1177/003804070808100201>.
- Ridge, T., 2011. The everyday costs of poverty in childhood: a review of qualitative research exploring the lives and experiences of low-income children in the UK. *Child. Soc.* 25, 73–84. <https://doi.org/10.1111/j.1099-0860.2010.00345.x>.
- Ripley, R.M., Snijders, T.A.B., Boda, Z., Vörös, A., Preciado, P., 2022. *Manual for RSienna Version 4.0 (version April 28, 2022).* University of Oxford, Oxford, UK.
- Shutts, K., Brey, E.L., Dornbusch, L.A., Slywotzky, N., Olson, K.R., 2016. Children use wealth cues to evaluate others. *PLoS One* 11, e0149360. <https://doi.org/10.1371/journal.pone.0149360>.
- Simmel, G., 1950. *The Sociology of Georg Simmel*, 92892. Simon and Schuster.
- Sletten, M.A., 2010. Social costs of poverty; leisure time socializing and the subjective experience of social isolation among 13-16-year-old Norwegians. *J. Youth Stud.* 13, 291–315. <https://doi.org/10.1080/13676260903520894>.
- Snijders, T.A.B., Bosker, R.J., 2012. *Multilevel analysis: an introduction to basic and advanced multilevel modeling, second ed.,* Sage, London.
- Snijders, T.A.B., Koskinen, J., 2012. Multilevel longitudinal analysis of social networks [WWW Document]. stats.ox.ac.uk. URL (https://www.stats.ox.ac.uk/~snijders/siena/MultilevelSAOM_s.pdf) (accessed 11.30.20).
- Snijders, T.A.B., Lomi, A., 2019. Beyond homophily: incorporating actor variables in statistical network models. *Netw. Sci.* 7, 1–19. <https://doi.org/10.1017/nws.2018.30>.
- Snijders, T.A.B., van de Bunt, G.G., Steglich, C.E.G., 2010. Introduction to stochastic actor-based models for network dynamics. *Soc. Netw.* 32, 44–60. <https://doi.org/10.1016/j.socnet.2009.02.004>.
- Stark, T.H., Leszczensky, L., Pink, S., 2017. Are there differences in ethnic majority and minority adolescents' friendships preferences and social influence with regard to their academic achievement? *Z. Erzieh.* 20, 475–498. <https://doi.org/10.1007/s11618-017-0766-y>.
- The American Association for Public Opinion Research, 2016. *Standard definitions: Final dispositions of case codes and outcome rates for surveys, ninth ed.,* AAPOR.
- Socialstyrelsen, 2010. *Social rapport 2010.* Stockholm.
- Stauder, J., 2014. Friendship networks and the social structure of opportunities for contact and interaction. *Soc. Sci. Res.* 48, 234–250. <https://doi.org/10.1016/j.ssresearch.2014.06.004>.
- Tippett, N., Wolke, D., 2014. Socioeconomic status and bullying: a meta-analysis. *Am. J. Public Health* 104, e48–e59. <https://doi.org/10.2105/AJPH.2014.301960>.
- Weyns, T., Colpin, H., De Laet, S., Engels, M., Verschueren, K., 2018. Teacher support, peer acceptance, and engagement in the classroom: a three-wave longitudinal study in late childhood. *J. Youth Adolesc.* 47, 1139–1150. <https://doi.org/10.1007/s10964-017-0774-5>.
- Wolke, D., Copeland, W.E., Angold, A., Costello, E.J., 2013. Impact of bullying in childhood on adult health, wealth, crime, and social outcomes. *Psychol. Sci.* 24, 1958–1970. <https://doi.org/10.1177/0956797613481608>.
- Zandberg, T., Huisman, M., 2019. Missing behavior data in longitudinal network studies: the impact of treatment methods on estimated effect parameters in stochastic actor oriented models. *Soc. Netw. Anal. Min.* 9, 8 <https://doi.org/10.1007/s13278-019-0553-2>.