Makara, K., and Karabenick, S. (2017) Longitudinal high school research revealed: using surveys to assess student motivation and social networks. In: *SAGE Research Methods Cases Part 2 [online].* SAGE Publications. (doi:10.4135/9781473977747)

http://eprints.gla.ac.uk/135736/

Deposited on: 01 February 2017

SAGE Research Methods Case Submission for Consideration

Case Title:	Longitudinal High School Research Revealed: Using Surveys to Assess Student Motivation and Social Networks
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Abstract

This case describes a longitudinal study of high school students' academic and social motivation and social networks at school. When working together as a PhD student and advisor, we built a university-school partnership and conducted a student survey project that spanned five years. A portion of the project data was used for a dissertation on students' social networks and their academic and social motivation. The case study describes the project context and development of the partnership, the research design and procedure, and an overview of the analysis and dissemination of complex data to school staff. Particular attention is paid to the use of social network analysis (SNA) as a methodological tool for assessing social relationships in schools. The longitudinal nature of the study required maintenance of a sustainable relationship with the school, which is discussed throughout. We conclude the case with lessons learned.

Learning Outcomes

By the end of this case students should be able to:

- Have a better understanding of the challenges and benefits of conducting research within school settings
- Understand how projects may serve different roles for different stakeholders
- Understand the advantages of using SNA for measuring social relationships within schools
- Have a better understanding of the methodological decisions that must be made when surveying students within school settings
- Describe several reasons why missing data may occur within longitudinal studies
- Understand how presenting research findings to school staff is different than presenting to an academic audience

Longitudinal High School Research Revealed:
Using Surveys to Assess Student Motivation and Social Networks

As a PhD student and advisor, we conducted a large longitudinal research project in a public high school that spanned five years and included numerous waves of survey data collection. The research focused on student perceptions of the school's social climate, academic and social motivation, and connections with peers and teachers. A portion of the project data was included in a dissertation that utilised social network analysis (SNA) and a range of statistical procedures. This case begins with the project context and development of the school-university partnership. Second is an overview of the research methods and how the research design was balanced with real-world constraints. Third is a description of the use of SNA in the study and the process of disseminating results to the teachers and administration. We conclude with lessons learned.

A. Project context: The beginnings of a school-university partnership

Background

A newly opened high school contacted our university for guidance in measuring social climate, a core focus of the school's mission. Scholars from our School of Education met to begin selecting potential questionnaires to be given in a student survey at the school. We stepped in to help forge a cohesive partnership in which we could provide resources and in turn conduct empirical research. We engaged in conversations with the school principal to discuss how the research may be conducted and to ensure school goals were met. In the second year of the school's opening, the first author (then a PhD student) began meeting regularly with the teachers to co-develop a long-term plan for collecting data on a range of psychosocial and school climate variables. We conducted a pilot survey mid-year and presented the findings to the teachers at a professional development day, which was a key step toward establishing the partnership.

Research objectives

We are educational psychologists interested in how aspects of the school context impact student motivation and achievement. The dissertation that emerged from this project focused on the connections between students' peer relationships, their academic and social goals, and their academic achievement. There is ample evidence that peer relationships matter for students' motivation and academic outcomes (e.g., Altermatt & Pomerantz, 2005; Buhs, Ladd, & Herald, 2006; Kindermann, 2007; Ryan, 2001, Wentzel, Barry, & Caldwell, 2004; Wentzel & Caldwell, 1997). The dissertation (Makara, 2013) built upon previous research and was partitioned into three broad research objectives: 1) to describe the dynamic nature of the high school peer social network and students' academic and social motivation, 2) to understand the relationships and predictive influence among students' academic goals, social goals, peer network position, and academic achievement across the school year, and 3) to examine the impact of peers' academic goals, social goals, and academic achievement on students' own goals and achievement. Using the framework of Achievement Goal Theory (Ames, 1992; Elliot, 2005; Elliot & Dweck, 1998; Elliot & McGregor, 2001; Ryan & Shim, 2006), students' goals consisted of and were assessed to determine the degree to which they were focused on developing competence, demonstrating competence, or avoiding demonstrating incompetence in the academic and social domains of school. Social network analysis

procedures provided measures of students' positions and connections within the overall high school peer social network.

In addition to the dissertation (Makara, 2013), the student surveys afforded the opportunity to address such questions as: To whom do students go to for academic help at school? and How do perceptions of the school social climate impact changes in students' social motivation over time? Overall, the project has led to several studies and presentations (e.g., Makara, 2014; Makara & Karabenick, 2012; Makara & Karabenick, 2014; Makara & Madjar, 2015), and more are expected as we continue to analyze the data. The project was mutually-beneficial for two reasons: it provided crucial information that contributed to the school's internal evaluation of their school climate, and it resulted in a longitudinal research project focused on a range of questions related to academic and social aspects of schooling.

Connecting with teachers, school leaders, students, parents, and the district

Forming and maintaining relationships with the school was vital. We met regularly with the principal to describe the project and ensure that both sides' goals were met. This involved working closely with one teacher who became our "champion", led a committee of teachers devoted to the project and helped to ensure open communication between the school and research team. To further publicize the project and collect the necessary permissions for student participation, the first author set up a booth during registration days and spoke at a parent-teacher-organization meeting. On two occasions we also met directly with students to discuss the survey and seek their feedback. This was incredibly valuable, and in retrospect is one practice that we wish had been implemented more formally throughout the project. It is worth noting that researchers typically begin by contacting and coordinating with the district. However, because the school first approached the university for assistance, this project evolved from the bottom up, starting with the principal and teachers. District cooperation was needed, however, to provide securely held data such as participants' grade point average, and the principal assumed this role.

Forming these relationships was definitely a learning curve for the first author, and it took approximately a year before routines were established. For example, on one occasion a planned survey date was changed at the last minute because of an assembly at the school. This had implications for printing and delivering surveys in addition to changing the research design. Some aspects of the research design may be out of the researchers' control, which although not ideal is often the reality of working with schools. Maintaining open communication with school staff ensured that this happened less frequently. This example highlights the need to attend to those aspects of the research design that are non-negotiable, and the need for tactful and reasonable explanations for why this is the case when discussing options with the school.

B. Research methods: Balancing high quality design with real-world constraints

Participating school

The study was conducted at an urban public high school in the Midwestern United States. The school opened in 2008 and added one grade level at a time until it reached the full set of 9th-12th graders during the 2011-2012 school year (approximately 1,500 students). Publically available school demographic records from the first year of the project, 2010-2011, reported the school racial

composition as 56% European American, 18% African American, 10% Asian, and the remaining 16% as Hispanic/Latino, Middle Eastern, or Bi/Multi-racial. On a state standards-based test administered in 2010-2011, 80% of the school population was at or above proficient in reading and 77% in mathematics. Having a school that was new, and also quite high achieving, meant that we were somewhat limited in being able to generalize results to schools with dissimilar demographics. However, these same characteristics may have allowed the project to run more smoothly since the school was not undergoing pressures due to low achievement or high teacher turnover that some other schools face. The study spanned a total of eight waves of data collection. Based on the challenges of collecting permissions from students and guardians, the sample size was approximately 800 or more students per wave, although as typical for longitudinal studies the final numbers decreased when merging data across waves.

Designing surveys

A self-report student survey with previously standardized scales was considered an appropriate methodology to efficiently and effectively measure the numerous variables of interest several times each year. Scanable hardcopy surveys were considered the most effective method for data collection by the school. Standardized measures were carefully selected based on a range of factors including age appropriateness and previous validation. Measures were selected that were suitable for our own research interests as well as for the school's goals. This was accomplished through sharing lists of potential measures that we deemed appropriate with the teacher committee to ensure that they were satisfied with the measures. We chose short measures that would provide reliable data, reduce student fatigue and require less time. The final surveys included such measures as academic goals, social goals, classroom goals, perceptions of teacher support and academic press, perceptions of peer climate, academic help seeking, bullying, perceived challenge across subject domains, and academic aspirations and expectations. Also included were social network measures that asked students to list up to ten peers and three teachers they interacted with the most at school. Pilot work was conducted to test and refine the measures before surveying the entire school.

Informed consent

Data were obtained as part of a regularly scheduled evaluation of students' perceptions of school climate at the high school. In order to use some of the survey data for research purposes, however, since the participants were under 18 and the social network component of the surveys included students listing their peers' names, written permission was required from both the students and their parents or guardians. This also entailed obtaining approval from the university's Institutional Review Board (IRB), which was challenging and required an in-person meeting with the IRB committee to clarify the research methodology and protection of the data. According to IRB ethical policies, rather than opting out, parents and guardians were required to "opt in" via a signed form indicating their permission. Students were provided an assent form on the surveys, and guardian consent forms were collected during registration in the fall as well as mailed home. Furthermore, letters were put in teacher mailboxes to inform them about the use of some of the data for research purposes. The nature of the project, types of questions that would be asked, confidentiality and protection of the information provided on the surveys, and contact information for the researchers were described thoroughly on the consent forms. Only surveys for which both

student and guardian permission was obtained were included and analyzed for research dissemination purposes.

Complex research design

One of the most challenging aspects of the longitudinal research design was accommodating the changes in student populations each year due to a new cohort entering and another cohort graduating. The resulting study (see Table 1) consisted of a cohort-sequential design (Reis & Judd, 2000) that includes a combination of both longitudinal and cross-sectional features. This sampling design had consequences for collecting permissions and for analyzing and presenting data. For example, each year required collecting new permissions from the entering 9th grade cohort. Added to this complexity, the high school added one new grade each subsequent year after opening in 2008; thus during the pilot year there were only 9th and 10th graders, during the 2010-2011 school year there were only 9th through 11th graders, and starting in the 2011-2012 school year there was a full set of 9th-12th graders.

Table 1. *Overview of the Research Design*

Year	2009/2010	2010/2011			2011/2012			2012/2013			2013/2014	
Survey Wave	Pilot	1	2	3	4	5	6	—	7	—	—	8	—
Cohort (Grade Level)	A (10th)	A (11th)			A (12th)								
	B (9th)	B (10th)			B (11th)			B (12th)					
		C (9th)			C (10th)			C (11th)			C (12th)		
					D (9th)			D (10th)			D (11th)		
								E (9th)			E (10th)		
											F (9th)		

Survey data collection

Surveys were collected three times a year (beginning, middle, and end) during the first two years of the main project, then once a year in the third and fourth years. As shown in Table 1, each year a new 9th grade cohort joined the school. In the end there were six cohorts within our dataset (A-F). While ideally surveys would have been conducted every four months exactly, in some cases we had to adjust the timing slightly due to other scheduled events occurring at the school. Another important consideration is that teachers administered the surveys as part of the school's regularly scheduled evaluation. This has implications for the data quality. Ideally, trained researchers would administer the surveys; however that was not an option in this case given that all classrooms in the entire school (approximately 70) needed to administer the survey at the same time. Teachers read instructions from a carefully constructed script and had students place their surveys in an envelope when completed in order to reinforce that their responses would be kept confidential. All identifying information was replaced with code numbers and data securely stored in accordance with IRB regulations.

C. Analysis and sharing research findings

Social network analysis

SNA was a unique aspect of our research study. It allowed us both to describe the student social network and draw inferences about how social processes develop throughout the school year (Wasserman & Faust, 1994). A social network is the social structure or pattern of individuals who have ties to each other through some form of interdependence (e.g., friendship, influence, or interaction). An important series of methodological decisions is required when conducting SNA. These include defining the sample for data collection, defining the relationships to measure, deciding how to collect the data, and selecting an appropriate approach for network analysis. This project measured social ties between students across the entire school rather than within classrooms. This decision provided for a more appropriate documentation of natural friendships in the high school setting (Kindermann & Gest, 2009) where students are regularly changing classes, and because all other variables of interest in the project were framed at the school rather than the classroom level. We pilot tested the measure before implementation.

On the survey, students were instructed to: "Please list the students at [name of school] that you hang out with the most, in no particular order. You do not have to fill in all the blanks. These names will not be seen by anyone at your school." The instructions were adapted from several studies, but notably the words "hang out" come from Ryan's (2001) network analysis with adolescents. Ten spaces were provided for students to write their peers' first and last names. Providing students with a checklist was not an appropriate option in this study due to the large number of students it would have required. It should be noted that collecting social network information raises privacy concerns, especially when collecting data from minors within schools. For example, Penuel et al. (2006) describe educators' concerns about collecting and sharing network data. Additional procedures were required to guarantee confidentiality since students provided identifiable information on the surveys. Thus, upmost care was taken to ensure confidentiality; for example, once data from SNA and district provided data were merged, names were replaced with project ID codes. At no point were individual students identified in any dissemination; rather, overall patterns of students' positions in the network and the number of connections to peers related to their motivation and achievement were reported.

There are various ways to analyze network data. SNA may be used to study students' selection of friends (e.g., with whom they form and dissolve friendships) as well as how peers act as socializing agents. For example, Kindermann (1993; 2007) and Ryan (2001) found that students become more similar to their peer groups' levels of motivation and achievement over time. In this project, we focused on how students' personal characteristics impacted their position in the overall school social network and consequently how students' position in the network predicted their motivation and achievement outcomes. It is important to note that we used SNA not only for descriptive purposes, but also to create variables that quantified students' social connectedness at school. This was accomplished by using SNA to calculate measures such as the number of peers with whom students are connected to (e.g., indegree, outdegree) or how their connections to certain peers impacts their indirect connections to others (e.g., betweenness). Students' centrality matters because it indicates the degree of access to social capital, the wide array of benefits one receives from his or her social structures (Coleman, 1988). We added these variables to the larger dataset of survey responses and were able to examine associations between the variables. For example, one aspect of the dissertation examined how students' position in the network predicted changes in

their grade point average. Evidence indicated that students who were more central in the peer social network at school (using Freeman's betweenness measure) increased in their grade point average across the school year. Students' social goals for the relationships with their peers also had implications for their number of peer connections and location in the social network.

Missing data

Missing data can become a major issue in longitudinal research, especially when compounded over multiple survey waves. Missing data can take several forms, such as missing from an entire year due to lack of parent or guardian permission or missing some items within one wave of data collection. The most common reasons for missing data in this project consisted of students missing from an entire wave of the survey due to entering or leaving the school during the school year, being absent, or not filling out the survey. This is one of the challenges of school-based research. For example, during one wave an entire classroom (approximately 25 students) did not complete the survey because a teacher failed to administer it. When conducting statistical analyses on standardised scales, such as students' academic and social achievement goals, there are procedures for estimating missing data such as multiple imputation (see Rubin, 1996).

SNA analyses are especially sensitive to missing data, which requires a high rate of participation in order to accurately represent a social network. SNA introduces an additional type of missing data, called the boundary specification problem (Laumann, Marsden, & Prensky, 1983) in which individuals are constrained in reporting their networks by the number of options allowed on the survey. All of these types of missing data can lead to inaccurate estimates of network-level statistics (e.g., Kossinets, 2006). Several steps were taken to remedy missing data for the SNA portion, such as providing a large number of spaces (i.e., 10) to list peers. Finally, measures were taken to prevent missing data from occurring in the first place, through multiple efforts to obtain permissions and careful survey processing.

Sharing research findings with the school

Most graduate students are encouraged to appropriately share their research through conference presentations or in the form of a dissertation or peer-reviewed publication. Less familiar, however, is the process of sharing data with stakeholders. In this instance, aggregated data were shared regularly with the administration and teachers at the high school through reports and annual professional development presentations. While reports are the standard for recording and sharing findings with schools, the inclusion of presentations ensured that all teachers had the opportunity to see the results of the data obtained, ask questions, provide their insights and suggest implications. For the professional development session toward the end of each year the first author created a presentation summarizing the major results from that year. Teachers then followed a "data driven protocol" to make predictions, discuss observations about the data, draw inferences about the data to explain why they believe students rated aspects of the school climate in particular ways, then set goals for the upcoming year. After completing the protocol in small groups, all staff joined together to summarize their discussions, and the school staff collectively identified quantifiable school climate goals to set as part of their school improvement plan.

Importantly, these presentations were very different than the type typically delivered at conferences since the driving rationale was practical, rather than theoretical, although theories were

introduced to clarify concepts. The presentation pulled from the school's mission and goals that were established the previous year. The results presented typically focused on changes over time within cohorts in order to demonstrate how student perceptions changed from year to year. As noted previously, social network diagrams were presented carefully to protect the identity of students and to showcase general social patterns across the school. The first author worked very closely with a small group of teachers before presenting to the full group to ensure that the information shared was understandable; for example, using percentages and frequencies rather than regressions or correlations. One year the technology teacher at the school recorded the presentation to be archived for the teachers, and set up a backchannel online chat room so that teachers could comment and ask questions in real time during the presentation. After the presentations we joined some of the teacher groups to listen to their guided discussions about the data. Starting in the later years we also collected feedback from teachers about the workshop. The teachers had thoughtful and critical insights about the data that enhanced our understanding of the project and had implications for subsequent data collections.

D. Practical lessons learned

There were a number of lessons learned from engaging in this longitudinal school-university partnership and its contribution to professional development, offered for your consideration.

Learn how to "sell" your project to different audiences

Put yourself in the shoes of the teacher, the parent, the student, the head of the district, or one of your dissertation committee members, and consider their concerns about the project. For instance, teachers are especially protective about how much time this will take away from their already strained schedules, whether the results will be used in an evaluative way, if they will be asked questions about it, and what they will gain from the project. Parents/guardians are concerned about whether their child's name will be shown anywhere, how secure the data is, whether it will cause any stress for their child, and how taking the survey impacts the child's time at school. Students are concerned with why they have to take a survey, why they may have to take it multiple times each year, and that it is boring, or worse, intrusive. The school district is concerned with managing multiple surveys and tests across the year, accountability for the project, and whether you can be trusted to work with this school and manage data. You and your dissertation committee members, and the university that you represent care about the quality of the research design, theoretical models, sampling procedures, validity and reliability of the survey measures, and choice of statistical analyses. In sum, you have a different story to tell about your project depending upon whom you speak to, and it is imperative to prepare different "selling points" for each audience using jargon-free language. The story you tell needs to be very clear, especially if you are collecting sensitive data, such as the social network data collected for this project.

Have a school "champion" for your project

Designating someone to be your project champion who is also a respected teacher at the school is vital to the success of the project. In this case, had the project been implemented top-down from the district we do not think it would have resulted in genuine interest and support from the staff. The project was successful and sustainable because of these connections. When finding your

school "champion", ensure that the teacher has truly accepted what it entails, be clear what responsibilities are assigned to the role, and treat the teacher as a collaborator in the research. Collaboration can include their assistance in survey design and research decisions, trusting their recommendations, being in regular contact, and of course frequently thanking the person for assuming their role in the effort. This relationship should be equal; you should both feel co-ownership of the project and learn as much or even more from the teachers as they learn from you. Our champion was a teacher at the high school who was our contact at the beginning of the project and helped us to transition across the years when the school switched principals. She would argue for the importance of the surveys at project meetings with the school, rally other teachers, and be our voice to school leadership. She also provided important insights into school events, issues, and concerns, which helped in the design of the study and interpretation of the data.

Plan for hidden costs

Whereas tangible expenses are easier to account for, such as the cost of printing and purchasing mailing supplies, "hidden" costs include extra resources needed for additional mailings, renewing software licenses, the time needed to manage the project, the space needed in this instance to store project files since it was necessary to use hard copy surveys, and the biggest of all, the expense of additional personnel. When faced with three waves of approximately 1,000 hardcopy surveys per wave each year, having just one student and one research assistant was unrealistic for processing surveys, manually coding the written social network data, organizing mailings, and sorting and storing surveys. The second author (then advisor) provided extensive resources from his research budget, including paid research assistants to help with the project, a survey scanning system, and office space, without which this extensive data collection and processing would not have been possible. The first author (then PhD student) was also awarded several small grants to help with project costs, including funds from the Rackham Graduate School and the American Psychological Association Division 15 dissertation research award. Finally, we took advantage of our university's undergraduate research program that provided several undergraduate assistants the opportunity to participate in the project. Bottom line—apply for all opportunities that are available for research support.

Organize electronic and hardcopy project materials and data

The final lesson learned is to emphasize the importance of organization and great care in tracking the research process. This project was the first author's first time managing a large longitudinal project, and the organization scheme had to continually be developed and updated as the project progressed. Several incidents highlighted how vital organization is for project success. As one example, there were several occasions where a series of decisions that were made regarding creating new variables or re-coding data were forgotten, which necessitated revisiting the raw data and thus considerable duplication of effort. Organizational issues to consider when conducting longitudinal survey analysis include (but are not limited to) keeping detailed notes on every research decision from the selection of questionnaires to data coding choices, having a clear codebook with details regarding all variables including new variables created from raw data, keeping detailed notes from research meetings, having a clear file naming system, securely backing up data, securely storing hardcopy documents such as permission forms, and document version control. Regarding storage,

we used a combination of a secure university-based cloud storage system with password protected files for sensitive data, locked cabinets for storing sensitive hardcopy documents, and binders for non-sensitive project materials. The acceptable procedures for data storage will likely change over time; therefore, it is worth contacting your IT department, librarians, and IRB office to determine your options. Finally, it is worth noting that many funders now require research data to be open access, and thus vital that clear documentation is maintained throughout the project.

E. Conclusions

We greatly valued this school-university partnership, and both sides felt that the project was successful, although not without its challenges. Inevitably the project involved some trial and error and therefore we hope this case study can help prepare future researchers who are contemplating similar projects. Especially challenging was organising and conducting a study with a complex longitudinal cohort-sequential design and the use of hardcopy surveys and manual data coding that was required. Nevertheless, school-based research is especially rewarding, and when conducted carefully is well worth the effort. In the end, we gained extensive insight into the complex associations between academic and social aspects of students' lives at school.

Exercise and Discussion Questions:

1. This case highlighted the importance of building a trusting relationship with schools when conducting school-based educational research. What are some ways that graduate students and their advisors can build trust with teachers and principals?

2. Social network analysis is a powerful tool for understanding patterns of relationships within the school. What are some potential ethical concerns when using social network analysis? How can these be mitigated?

3. This research project involved a cohort-sequential design. What is a cohort-sequential design? What are some of the benefits of a sequential design over solely cross-sectional and solely longitudinal designs?

4. What are some additional ways to reduce missing data when conducting longitudinal survey studies? After collecting data, what are some statistical procedures that can be used to address issues of missing data?

5. Sometimes conducting research in schools results in findings that have negative implications for the

school. What is the best way to plan for this type of occurrence? What can researchers do to ensure that unfavorable findings are treated as "lessons learned" and do not harm the school-university partnership?

List of Further Readings:

Carolan, B. V. (2013). *Social Network Analysis and Education: Theory, Methods & Applications*. SAGE Publications.

Menard, S. (2002). *Longitudinal Research* (Vol. 76). SAGE Publications.

Links to any relevant web resources:

http://karamakara.com/dissertation

Bibliography of references cited in text:

Altermatt, E. R., & Pomerantz, E. M. (2005). The implications of having high-achieving versus low-achieving friends: A longitudinal analysis. *Social Development*, *14*(1), 61–81. doi: 10.1111/j.1467-9507.2005.00291.x

Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology*, *84*(3), 261–271. doi: 10.1037/0022-0663.84.3.261

Buhs, E. S., Ladd, G. W., & Herald, S. L. (2006). Peer exclusion and victimization: Processes that mediate the relation between peer group rejection and children's classroom engagement and achievement? *Journal of Educational Psychology*, *98*(1), 1–13. doi: 10.1037/0022-0663.98.1.1

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, *94*, S95–S120. doi:10.2307/2780243

Elliot, A. J. (2005). A conceptual history of the achievement goal construct. *Handbook of competence and motivation, 16,* 52–72.

Elliot, A. J., & Dweck, C. S. (1988). Goals: An approach to achievement and motivation. *Journal of Personality and Social Psychology, 54*(1), 5–12.

Elliot, A. J., & McGregor, H. A. (2001). A 2 x 2 achievement goal framework. *Journal of Personality and Social Psychology*, *80*(3), 501–519.

Kindermann, T. A. (1993). Natural peer groups as contexts for individual development: The case of children's motivation in school. *Developmental psychology*, *29*(6), 970.

Kindermann, T. A. (2007). Effects of naturally existing peer groups on changes in academic engagement in a cohort of sixth graders. *Child Development*, *78*(4), 1186–1203. doi:10.1111/j.1467-8624.2007.01060.x

Kindermann, T. A., & Gest, S. D. (2009). Assessment of the peer group: Identifying naturally occuring social networks and capturing their effects. In Rubin, K. H., Bukowski, W. M., & Laursen, B. (Eds.), *Handbook of peer interactions, relationships, and groups* (pp. 100-117). New York, NY: Guilford Press.

Kossinets, G. (2006). Effects of missing data in social networks. *Social Networks, 28*(3), 247–268. doi: 10.1016/j.socnet.2005.07.002

Laumann, E. O., Marsden, P. V., & Prensky, D. (1983). The boundary specification problem in network analysis. In Burt, R. S., & Minor, M. J. [Eds.], *Applied network analysis: A methodological introduction* (pp. 18–34)*.* Beverly Hills, CA: Sage.

Makara, K. A. (2013). *Students' peer relationships, social and academic goals, and academic achievement: A social network analysis approach*. (Doctoral dissertation). University of Michigan, Ann Arbor. Retrieved Sept 18 2015 from http://deepblue.lib.umich.edu/handle/2027.42/97959.

Makara, K. A., (March, 2014). *Examining the association between peers' academic and social goals and high school students' academic achievement*. Paper presented at the Biennial Meeting of the Society for Research in Adolescence, Austin, TX.

Makara, K. A., & Karabenick, S. A. (April, 2012). *Exploring peer relationships, academic and social motivation, and achievement: A social network analysis approach*. Paper presented at the American Educational Research Association, Vancouver, British Columbia, Canada.

Makara, K. A., & Karabenick, S. A. (June, 2014). *From whom to seek help? High school students' perceived benefits, costs and preferences from teachers, friends and parents*. Paper presented at the International Conference of Motivation, Helsinki, Finland.

Makara, K. A., & Madjar, N. (2015). The role of goal structures and peer climate in trajectories of social achievement goals during high school. *Developmental Psychology, 51(4)*, 473-488. doi: 10.1037/a0038801

Penuel, W. R., Sussex, W., Korbak, C., & Hoadley, C. (2006). Investigating the potential of using social network analysis in educational evaluation. *American Journal of Evaluation*, *27*(4), 437-451.

Reis, H. T., & Judd, C. M. (2000). *Handbook of research methods in social and personality psychology*. Cambridge University Press.

Rubin, D. B. (1996). Multiple imputation after 18+ years. *Journal of the American Statistical Association*, *91*(434), 473-489.

Ryan, A. M. (2001). The peer group as a context for the development of young adolescent motivation and achievement. *Child Development*, *72*(4), 1135–1150. doi: 10.1111/1467-8624.00338

Ryan, A. M., & Shim, S. S. (2006). Social achievement goals: The nature and consequences of different orientations toward social competence. *Personality and Social Psychology Bulletin*, *32*(9), 1246-1263.

Wasserman, S., & Faust, K. (1994). *Social network analysis: Methods and applications* (Vol. 8). Cambridge University Press.

Wentzel, K. R., Barry, C. M., & Caldwell, K. A. (2004). Friendships in middle school: Influences on motivation and school adjustment. *Journal of Educational Psychology*, *96*(2), 195–203. doi: 10.1037/0022-0663.96.2.195

Wentzel, K. R., & Caldwell, K. (1997). Friendships, peer acceptance, and group membership: Relations to academic achievement in middle school. *Child Development*, *68*(6), 1198–1209. doi: 10.2307/1132301