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Academic Advising: Measuring the Effects of "Proactive" Interventions on Student Outcomes

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Outline of the Project

Since 2012, the Education Policy Research Initiative (EPRI) has supported Mohawk College in its efforts to collect and use administrative and other data on students held by Mohawk as part of a broader initiative to improve student success based on the principle of evidence-based decision making. This is the third research report resulting from this partnership and the second related to the Predictive Modelling and Advising project.

This project has two phases of investigation. The first phase of this project (Finnie, Poirier, Bozkurt, Fricker, & Pavlic, 2017) focused on the development of a predictive model of student retention and examined how advising participation rates and retention rates differ across different risk groups identified by the predictive model.

The second phase of the project, which is the subject of this report, evaluates an experiment using proactive advising to support new, first-year students at Mohawk College in the fall of 2015. All first-year students entering the college were randomly assigned to one of three groups: group advising, one-to-one advising and a control group. In the six weeks before the start of fall classes, all students received emails from the college along with advising materials. The advising treatment groups received a message that "strongly encouraged" them to attend either group or one-to-one advising sessions. The students who did not book an appointment received this email up to three times and then a follow-up phone call from a student leader. The control group was informed about advising resources, but was not offered services prior to the start of classes.

We used this experimental research design to answer the following questions:

1. How do proactive group and one-on-one academic advising interventions affect students' advising participation rates and leaving rates at Mohawk College?
2. Are there any differences in the efficacy of interventions on the advising participation or leaving outcomes of students, based on the Student Risk Classifications (SRCs derived from the predictive model in the first phase)?

Key Findings

The key findings can be summarized as follows:

- The offer of proactive group advising improves overall retention over one term by 2.5 percentage points, while one-to-one advising has no statistically significant effect on either one-term or one-year retention.
- The offer of proactive advising improves retention for males, whereas there are no statistically significant effects for females.
- Males who were offered either of these advising services were around 4 percentage points less likely to leave during the first semester compared to a leaving rate of 18.8% for the control group.

- The one-year effects of group advising for males, driven mainly by the low-risk students, were only slightly higher (by 1 percentage point) than the one-term effects, indicating that the effects are concentrated in the first semester. The one-year effects for one-to-one advising were the same as one-term effects.
- There were no clear and consistent patterns for the effects on leaving by risk categories.
- Women who were offered group advising saw their adviser in their first semester at higher rates (3.4 to 3.7 percentage points higher compared to a rate of 13.4% for the control group). In contrast, neither female advising participation rates during the first year nor male participation rates over either interval were affected by the offer of either group or one-to-one advising services.
- By student risk categories, the positive one-term advising participation effects of group advising for females seem to be driven mainly by high-risk females. In contrast, low-risk males saw negative effects on their participation rates for group advising over both time intervals, while medium-risk males saw positive effects on their one-year advising participation rates.

Conclusions and Avenues for Future Research

The findings suggest that proactive advising improves student retention for males and increases female participation rates in advising programs. Similar effects were found for proactive group and one-to-one advising on male leaving outcomes. And finally, the larger effects found for group advising on female advising participation rates suggest that offering proactive group advising could be a promising practice to improve student outcomes in a cost-effective manner.

The findings point to a number of directions for future research. First, it is possible that similar results could be found at other colleges and universities. Replicating this project with future cohorts of students at Mohawk College and at other colleges and universities would, if found to yield similar findings, validate the findings reported in this paper. The results of such experiments would likely be of considerable interest to a broad group of college, student-affairs, and academic-advising stakeholders.

Second, the channels by which the test programs operate could be assessed by administering a survey that asked students what they thought about the emails, whether they felt more or less motivated to pursue their studies and/or attend the advising services during the term or year, and otherwise how the emails changed their experiences or behaviour. These would help us assess whether there could be any direct effects of the more proactive outreach approach (i.e., the random assignment to any of the treatment groups) on student outcomes such as improving their motivation, as opposed to their working through their participation in the advising programs offered per se.

A survey of this type could also provide insight into what particular aspects of the proactive advising made a difference to students and why the effects were so different for men and women. Similarly, advisers could also be surveyed or interviewed about their experiences, observations and lessons learned about student needs.

Third, there is strong evidence that comprehensive approaches, such as the bundling of support programs like the City University of New York's Accelerated Study in Associate Programs (ASAP) initiative (Scrivener, Weiss, Ratledge, Rudd, Sommo, & Fresques, 2015) and the Guided Pathways (Bailey, Jaggars, & Jenkins, 2015) approach to institutional reform, make the greatest impact on student success. These often include

mandatory participation in advising programs, full-time enrolment, and financial incentives such as bus passes, textbooks and tuition. Mohawk could bundle some of these programs and services, or perhaps others they have already tested such as Future Authoring (Finnie, Poirier, Bozkurt, Peterson, Fricker, & Pratt, 2017), into a more comprehensive suite of proactive advising support practices, put these in place, and evaluate their effects.

Fourth, extending proactive advising more formally with emails and phone calls into the first and subsequent semesters could also be tried. Such practices could have a greater impact on student success than the pre-term contact tested here.

1. Introduction

Enrolment rates in postsecondary education have increased dramatically in Canada; however, only around 75% to 80% of students continue to their second year and long-term average completion rates are around 60% (Grayson & Grayson, 2003).[1] Student retention is influenced by a large array of factors, most of which are often hard to measure (Wiggers & Arnold, 2011), such as student commitment, motivation and engagement. Therefore, improving student retention remains one of the most important and difficult problems that postsecondary institutions face.

Postsecondary institutions offer a wide variety of programs and services to support student transition and success. These programs include developmental courses for unprepared students, first-year orientation programs and mentoring programs, to name just a few. Proactive advising for new students soon after arriving at an institution is an approach that is documented in the American literature as important, but it has also received attention in Canada within the Ontario college system.[2]

With increasing access to postsecondary education and a more diverse student body, delivering advising, and any student-success initiative for that matter, in a cost-effective and scalable manner is a priority. One way to reach more students is through group advising, an approach that has seen some positive results in American institutions.[3]

Furthermore, some colleges and universities in Canada use new programs, including mentoring by upper-class students, financial incentives, and self-authoring workshops, to test and identify feasible and efficient ways to further improve student retention.[4]

This report evaluates a new experiment that focuses on proactive advising undertaken at Mohawk College. All first-year students entering Mohawk in Fall 2015 were randomly assigned to two treatment groups and a control group. All students were contacted before the start of the semester via email and informed about the advising services that were available to them. The email reminders were more frequent for the two treatment groups while the control group received only one informational email. The two treatment groups were offered an opportunity to participate in an advising session six weeks prior to start of the semester, but one treatment group was invited to group advising sessions while the other treatment group was invited to one-to-one sessions.[5]

This report is the second of two reports resulting from a research project undertaken in a collaboration between HEQCO, Mohawk and the Education Policy Research Initiative (EPRI). The project focuses on

1 The postsecondary enrolment rate, calculated as the ratio of postsecondary enrolment to the population of those who are between 18 and 24 years old, has increased from 47.9% to 60.6% from 2000 to 2014 (Statistics Canada CANSIM Tables 477-0019 and 051-0001).
2 See Glennen (1975) and Varney (2013) in the American literature, and R. A. Malatest & Associates Ltd. (2009), Dietsche (2012) and Poirier (2015) in the Canadian literature.
3 See Hollins (2009), Gordon and Steele (2015), Bentley-Gadow and Silverson (2005).
4 See Angrist, Lang, and Oreopoulos (2009), Angrist, Oreopoulos, and Williams (2014) for studies on academic support services and financial incentives, and Finnie et al. (2017b) and Morisano, Hirsch, Peterson, Pihl, and Shore (2010) for studies on self-authoring workshops.
5 The advising sessions offered were in-person for both one-to-one and group advising. Long-distance or International students were offered an opportunity to participate in a Skype appointment (only available for one-to-one sessions). The uptake on this option was marginal with less than a dozen choosing to schedule a Skype appointment.

predictive modelling to classify students at risk of leaving college early and evaluating new approaches to outreach and academic advising as a student success intervention for students before their first semester in college. The first phase of this project (Finnie et al., 2017a) focused on the evaluation of a predictive model and examined how advising participation rates and retention rates differ across different risk groups.

Understanding how proactive group and one-to-one advising affects leaving and advising participation outcomes of students is the central focus of the second phase of this research project. In this phase, we used an experimental research design to answer the following questions:

1. How do proactive group and one-on-one academic advising interventions affect students' participation rates in advising programs and leaving rates at Mohawk College?
2. Are there any differences in the efficacy of interventions on the advising participation or leaving outcomes of students, based on the Student Risk Classifications (SRCs derived from the predictive model)?

The report will briefly review relevant advising and student success literature, the design of the intervention, the data and methods used in the experiment, the results and a discussion about the implications for Mohawk College, limitations of the project and areas of future research. It is worth noting again that each element of this project was a partnership between Mohawk College and EPRI. Given the unique nature of this research, the study received approval from the Research Ethics Board at Mohawk College and the University of Ottawa before email recruitment and advising began.

2. Literature Review

While there is arguably no "silver bullet" for improving student success (Kuh, 2005; Wiggers & Arnold, 2011), the literature, especially within the community college sector, consistently identifies key activities that are promising for improving student outcomes. Most recently, these activities have included the use of predictive models (van Barneveld, Arnold, & Campbell, 2012), early-alert and intervention practices (Center for Community College Student Engagement, 2014), and academic advising (Braxton et al., 2014) — all of which can combine to establish a comprehensive approach to improving outcomes.

Early alert and interventions align with the theory and practice of intrusive or proactive advising (Glennen, 1975; Varney, 2013), which are intentional approaches to student outreach and support. A proactive approach to student success stands in stark contrast to the laissez-faire approach, which Dietsche (2012) found to be insufficient when supporting contemporary students. Specifically, after administering an extensive survey to 60,000 Ontario college students, Dietsche (2012) concluded that proactive outreach and advising were at the fulcrum of ensuring student success. This argument was echoed by Poirier's (2015) analysis of orientation and transition programs in three large Ontario colleges. Fricker (2015) identified that academic advising is frequently cited within the literature as a central service that fosters student success, especially for community college students. However, there is little literature exploring the practice of academic advising on college campuses in Canada (Fricker, 2015). Recently cited by Braxton et al. (2014), Grites (1979, p. 1) offers that academic advising is "a decision-making process during which students realize their maximum educational potential through communication and information exchanges with an adviser." More broadly, the Ontario Academic Advising Professionals (n.d.) encourage academic advising "to be understood in its broadest sense and may include those involved in providing academic advice, career

advice, counselling, liaison services, and/or learning skills opportunities in order to promote student success and retention."

Academic advising in Canada and the United States is primarily delivered in a one-to-one or individualized format between an adviser and a student. This is usually in person, but also sometimes over the phone or online. Individualized advising could be delivered via a short drop-in session, or a longer pre-booked appointment (Gordon & Steele, 2015; Fricker, Doyle, Ellingham, & Fernandez, 2016; Pardy, 2016). For example, Lynch and Stucky (2001, p. 15) noted from the NACADA Academic Advising Survey 2000, that "nearly 90% of all academic advising is delivered one-to-one."

The traditional model of one-to-one advising is often heralded as the centrepiece of student success strategies for community colleges (Braxton et al., 2014; Center for Community College Student Engagement, 2014; Habley, Bloom, & Robbins, 2012; Tinto, 1993); notably, in *Making the Most of College*, Light (2001, p. 81) even offers that, "good advising may be the single most underestimated characteristic of a successful college experience." This underestimation is likely due, in part, to a lack of comprehensive literature outlining the participation rates and effects of one-to-one advising. As Ellingham, Fernandez, and Fricker (2016, p. 19) note, "there is little Canadian-based research from practitioners or academics to support the professionalization of academic advising." Only recently was a comprehensive review of academic advising in British Columbia conducted, which provided insight into the infancy of advising within Canadian institutions (Pardy, 2016).

Participation rates in college student services more broadly, however, trend quite low despite the apparent need for student support. For example, in Ontario, the *Foundations for Success Project* (R.A. Malatest & Associates Ltd., 2009) lends insights into the low uptake by students of support services in general. After identifying at-risk students from language proficiency tests, students were assigned a case manager (adviser) to help them complete activities related to their individual risk factors. This project found that only 14% of students in the control group, who had typical access to support services but no access to an assigned case manager, engaged in support services — showing that when "left to their own devices" (R. A. Malatest & Associates Ltd., 2009, p. viii), the majority of at-risk students do not seek support.

Though traditional approaches to advising gravitate around individualized service, delivery models are now being explored by institutions that are balancing growing student populations and increasingly diverse student needs with operational, budgetary and staffing constraints. As Ryan (2009) notes, "there is a greater demand for advising than there are advisers to meet it." Consequently, with changing student populations and declining resources, postsecondary institutions have been compelled to redesign forms of service delivery for academic advising (Creamer, Creamer, & Brown, 2003; Woolston & Ryan, 2007) when faced with the dilemma of either "reducing services to students or by creating new venues and systems of delivering services more efficiently" (Jordan, 2000, p. 24–25). For instance, a third-party student coaching (advising) service offered by a company called InsideTrack, has delivered some positive results. Using an experimental design to evaluate this program, Bettinger and Baker (2014) found that students who received coaching were 5.2 percentage points more likely to be enrolled six months later than non-coached students, an effect that persisted for at least one year after coaching had finished. They also found larger effects for males with a 6.1 percentage-point improvement in the six-month retention rate for males, whereas for females the effect was only 2.5 percentage points. Coaches make regular contact with students over the phone and help them develop short-term and long-term goals while building time-management, self-advocacy and study

skills. Bettinger and Baker (2014) also found that the program was a cost-effective means of improving student success. Moreover, combining comprehensive advising, tutoring and career services is found to have increased the proportion enrolled (full-time and in the second semester) and the average number of credits earned, also with sizeable two- and three-year effects (Scrievener & Weiss, 2013; Scrievener et al., 2015). In contrast to these studies, Angrist et al. (2009) did not find any statistically significant effect of support services alone (in the form of mentoring by upper-year students) on academic performance. Instead, they found that combining support services with financial incentives (e.g., cash awards for meeting a target GPA) improved academic performance, with large and significant effects for females and small and not statistically significant effects for males. Angrist et al (2014), on the other hand, found that combining cash awards with the availability of peer advisers (upper-year students) had modest impacts on academic performance.[6]

Advising departments have evolved to offer more efficient group services. Since the late 1970s (Crockett, 1978), group advising has emerged as an "economy-of-time technique" (Grites, 1979, p. 17) that can help advisers become more efficient in their practice (Banta, Hansen, Black, & Jackson, 2002). For instance, the Sequential Advising Model was developed by the University of Northern Iowa, which capitalized on group advising to respond to the 50% increased workload advisers experienced due to retirements and budget constraints (Bentley-Gadow & Silverson, 2005). The Sequential Advising Model was developed with the goal of effectively servicing students "within the constraints of limited personnel and dwindling resources" (Bentley-Gadow & Silverson, 2005). The advantage of group advising is that "many students may be served with one effort" (Gordon & Steele, 2015, p. 194). Gordon and Steele (2015) summarize broadly that group advising "usually provides structured experiences and involves students in specific tasks while varying in duration and length of contact." Given this broad definition, its application as a practice provides institutions with a multitude of opportunities. As Ryan (2009) notes, "many advising events lend themselves ideally to a group process" including pre-enrolment meetings, orientations and first-year seminars. Group advising has been found to be an efficient and effective means of advising commuter students (King, 2008), undecided students (Stark, 2002) and first-generation students (Ryan, 2009), while affording advisers the opportunity to explore multiple advising approaches including appreciative advising (Sanchez, 2008) and proactive life-cycle advising (Grahn, 1982).

Unfortunately, little research on the efficacy of group advising has been conducted, especially in Canada. Citing their Sequential Advising Model, however, Bentley-Gadow and Silverson (2005) offer encouraging results related to efficiency measures, but no analysis related to student learning or success outcomes. For example, the University of Northern Iowa saw a 34% decline in individual appointments after the introduction of group advising for first-year and new transfer students, with the majority of the decrease being in student attendance in basic information sessions. The authors also note a "significant reduction in routine telephone and email traffic," highlighting that group advising may be a useful strategy for advising as student populations increase.

6 One of the differences in the experiments tested in Angrist et al. (2009) and Angrist et al. (2014) is how the cash awards are offered. The cash awards in Angrist et al. (2009) were conditional on meeting a target GPA, while the treatment group in Angrist et al. (2014) was offered $100 for each class with a grade 70 and above and an additional $20 for each percentage-point above 70.

With a lack of Canadian scholarship in the area of group advising — and, academic advising in Canada in general (Fricker, 2015) — some critics argue that group advising may be "driven solely by expediency" (Ryan, 2009). Moreover, some have voiced concerns that students would be intimidated by the group format (Sanchez, 2008). Some research reveals that group environments can, in fact, lead to positive advising experiences (Drake, Jordan, & Miller, 2013). With its roots in constructivism, a paradigm for teaching and learning that advocates for people to construct their own understandings based on personal experiences, career advising and counselling are enhanced cooperative and inclusive groups where members can focus on common goals (Niles & Harris-Bowlsbey, 2002). As Tinto (1993) theorized, isolation is a primary reason for attrition in postsecondary education, especially among certain groups like probationary or exploratory students, or commuter students who tend to work in a vacuum (King, 1993). With the potential for a strong normative influence, group advising allows students to connect to peers, and understand and normalize common challenges and experiences (Gordon & Steele, 2015), thus increasing students' sense of belonging to the institution (Nutt, 2000).

Of the few studies conducted on group advising in college settings, King (2000, p. 236) found that "the feeling of not being alone is a powerful by-product of the group experience," which can have equally powerful student outcomes. In a recent pilot of new orientation practices in the Virginia Community College System (VCCS), the retention rate for new students who participated in group advising was 72.4%, compared to a 56.7% retention rate for non-participants (Hollins, 2009). The positive student outcomes associated with group advising in the VCCS is paralleled by the experiences reported by students who participate in group advising at other institutions. For instance, students who participated in the Sequential Advising Model at the University of Northern Iowa reported consistently positive experiences in group advising sessions (Bentley-Gadow & Silverson, 2005). Moreover, a study comparing faculty-team approaches to advising students to traditional individual advising found that group advising facilitated "significantly reduced advising time with no loss in student satisfaction or knowledge of procedures and policies" (Grahn, 1982, p. 214).

Implementing a group advising program for college students is not without its operational challenges, however. In a study examining intrusive group advising for probationary students, researchers found that academic holds should be placed on students' registrations as a mechanism for ensuring group advising participation (Austin, Cherney, Crowner, & Hill, 1997). Without academic holds, a mere 1.9% voluntary uptake on group advising was seen among probationary students (Austin et al., 1997). Likewise, novice advisers may hesitate to facilitate group advising sessions due to a perceived challenge with group management (Ryan, 2009; Woolston & Ryan, 2007).

Given the gaps in the available literature regarding the nature and impact of one-to-one and group advising at Canadian colleges, this study aims to evaluate some new approaches to academic advising as a proactive student success intervention for students before their first semester in college.

3. Data and Methodology

3.1 Variable Definitions

This section briefly describes the variables used in the analysis discussed in this report. The selection of variables was determined by the availability of data at Mohawk College and follows a well-known and broadly used theoretical model in the persistence literature introduced by Tinto (1975, 1993). According to this model, students enter PSE with various pre-entry characteristics such as age, race, gender, family structure, parental educational attainment, high school preparation, as well as their own skills and abilities. These factors contribute to the formation of students' initial goals and their level of commitment to their studies.

Only full-time students who are registered in programs offered at Mohawk's Fennell campus are included in the analysis, because this is where the advising programs of interest to this project were put in place in Fall 2015. Part-time students were excluded because of the temporary and short-term nature of their enrolment, which makes it difficult to track their retention over time. There were 29 students who changed their full-time/part-time status and 38 students who switched to another program outside of the Fennell campus after they were assigned to the treatment groups. These students were dropped from the analysis. There were also 891 students who were not assigned to either of the experiment groups or the control group due to late registration.[7]

Student and Program Variables

The set of student and program variables includes gender, age, credential, school, regional status and high school average. Age is broken down into six categories: below 18 years old, 18, 19, 20 to 22, 23 to 26, and 27 or older. Regional status identifies whether the student resides in an urban or rural neighbourhood at the time of his or her application or whether the student is an international student (and thus does not have the preceding categories identified).

High school grade average tends to be an important predictor of retention for incoming students (Astin, 1997). This variable is computed as the average of the six highest grades (out of 100 points) from English and mathematics courses taken during the third and fourth year of high school.[8] These averages were then put into the following categories: A plus, A, A minus, B plus, B, C plus, C, D plus, D and F.

School corresponds to the program in which the student is enrolled (there are 17 schools). Credential has four categories: diploma, advanced diploma, certificate and graduate certificate.

7 The cut-off date to be eligible for assignment to either of the experimental groups was August 5, 2015.
8 We used only English and math courses in the average to keep the high school average variable consistent with that used in an earlier study. These were the courses that were available in the data (2005–2012) used in the earlier study which was used to develop the predictive model for the first phase of this research project (Finnie et al., 2017a).

Student Entrance Survey Variables

Mohawk College administers a Student Entrance Survey (SES) for incoming students at the beginning of each term. This survey was introduced at Mohawk in 2006 by Peter Dietsche as part of a project funded by the Ministry of Advanced Education and Skills Development to administer the Ontario College Student Engagement Survey. The survey was developed by Dietsche over the previous 20 years, including an earlier version that was used in the Pan-Canadian Survey of College Students (Dietsche, 2007, 2008). The survey has been used by Mohawk continuously since 2006 and has gone through some editing and refinement.

The SES is not a mandatory survey, but it does include responses from around 70% of the incoming population of the Fall 2015 cohort.

It includes questions that are intended to help identify some of the risk factors for leaving college early. Student responses to specific questions or groups of questions define each of the following variables: low career clarity, low confidence in abilities, working 15 hours or more a week while studying, having a hard time transitioning to life at Mohawk College, and low educational commitment. These are all binary variables (At-Risk = 1 and Not-at-Risk = 0) that identify what are thought to be risk factors for leaving college early.

Assessment Scores

Incoming students at Mohawk College undertake writing, reading and mathematics assessments before the start of their first semester. At Mohawk College, the reading and writing assessments are written on the Accuplacer platform using the WritePlacer software. The math assessment, developed by Mohawk College, is written on the Maple TA platform. Since there have been changes over the years in the scales used to score these assessments, each assessment variable was recoded for this study to reflect the student's relative position in the overall score distribution for the particular assessment he or she took.

The reading and mathematics assessment scores are grouped into eight similarly-sized categories, which range from 1 to 8. The lowest category indicates that the student's score is at the lowest end of the score distribution, while the highest category indicates that the student's score is at the top end of the score distribution. There are two categories for the writing assessment variable, one representing the scores at and below the median, and the other representing scores above the median.

In addition, since not all students take the assessment tests, missing categories were also included for each assessment. The proportion of students who completed the mathematics assessment is 34% and the proportion of students who completed the reading and writing assessments is 56%.[9]

9 Not all incoming students are asked to take the math assessment test.

Student Risk Classifications (SRCs)

One of the objectives of this phase of the research project is to test the different student advising strategies put into place for the incoming 2015 cohort of students across different student risk levels. The coefficients from predictive models estimated for term and year persistence are used to obtain risk levels or predicted leaving rates for students entering in the Fall 2015 semester.[10]

The full distribution of risk levels (or predicted leaving rates) was divided into three similarly-sized groups: low-, medium- and high-risk. Students whose predicted probabilities of leaving are in the first, second and third terciles are assigned to the low-, medium- and high-risk groups, respectively.

Treatment Group Indicators

There are two treatment groups in this study: those who were assigned to group-advising services and those assigned to one-to-one advising services before the start of classes. The students in the control group were encouraged to meet with their SSA soon after the start of classes, but were not contacted about any of the group or one-to-one advising services available to the treatment groups.

The regression models will include indicators for group and one-to-one advising treatment groups, and the coefficient estimates for these variables will give the difference in outcomes compared to the control group. These variables simply indicate whether or not a student was assigned to any of the treatment groups, and not whether they received those services.

The Outcome Variables: Leaving Rates and Participation in Advising Services

The outcome variables of interest in this analysis are whether or not the student left the program early and participation in student advising programs. We look at two leaving measures (did not leave = 0 and left = 1). The former represents one-term leaving (from Fall 2015 to Winter 2016) and the latter one-year leaving (from Fall 2015 to Fall 2016).[11]

Participation in student advising is defined as whether the student sought the help of Student Success Advisers during the first semester and first year. This data is collected through an advising software program called ClockWork, which is utilized by all Student Success Advisers at Mohawk College. We compute two advising participation variables: one-term and one-year advising participation rates. For the purposes of this analysis, they are binary variables (Did not seek advising = 0, sought advising = 1). These variables do not

10 The coefficients for predicting one-term leaving were obtained in Phase 1 of this research. Coefficient estimates for the predictive model for one-year leaving rates were obtained during the second phase of this project.

11 Day 10 of each term is used as the date to identify student retention, which corresponds to the end of the "add/drop" period at Mohawk College. In other words, this is the last day of the term when students can register. Students who are registered on day 10 of the initial Fall term are included in the analysis, and students are considered to have remained at Mohawk College if they are still registered at day 10 of the Winter term (one-term leaving measure) or day 10 of the following Fall term (one-year leaving measure). For the one-year leaving measure, we also check if the student is present in the Winter or Spring terms. The withdrawal status of those who return in the Winter semester is checked and those who withdraw before day 10 are also considered to be leavers. Some students who leave (particularly those who do not withdraw) will not have an entry in this file, but simply do not show up the next semester. Our approach allows for students who leave Mohawk College but do not go through the formal withdrawal process to be identified as leavers. Graduation status is also checked, and those who graduated are counted as continuers.

account for the frequency of advising support provided to a student, nor the length or type of advising interaction that occurred.

3.2 Experimental Design

Mohawk College randomly assigned first-year, Fall 2015 students to three groups. One third of the cohort received an email (see Appendix C, Figure C.1) before the term started advertising the SSAs and the services available to students during the term. Students were encouraged to meet with their SSA soon after the start of classes. This was the passive outreach approach and served as the control group. This is the established outreach for incoming Mohawk students. There were 1,577 students in the control group.

The second third of the cohort received virtually the same email at the same time as the control group; however, students in this group were provided with the opportunity to participate in an introductory group advising session available within the six-week period before the start of classes. These students received this email up to three times, and the text "strongly encouraged" attendance (see Appendix C, Figure C.2). They also received a phone call from a student leader in the second week of August 2015 to further encourage participation if they had not yet booked an appointment (see Appendix C, Figure C.4). We refer to this group as "group advising." There were 1,614 students in group advising.

The third group received the same email and outreach as the second group; however, instead of group advising, they were strongly encouraged to participate in a one-to-one advising appointment prior to the start of classes (see Appendix C, Figure C.3). Like the second group, they received this email up to three times and also received a phone call from a student leader in the second week of August 2015. We refer to this group as "one-to-one advising." There were 1,524 students in one-to-one advising.

The emails to the students offering one-to-one and group advising programs included a reference to this study and essential informed-consent information. The students could then initiate the process to book a meeting with an adviser.

All advising sessions for this study were centrally coordinated by the research team and facilitated in one location on campus. When students arrived for their advising session, they were greeted by staff who confirmed their appointment, walked them through a description of the research project and obtained informed consent. Students also received a package of advising materials including the session agenda, a "top 10 tips for student success," a checklist of items to complete before the first day of classes, and additional copies of relevant admissions information they had already received from the college. Once this process was complete, they were introduced to the adviser running the session. It should be noted that specially trained front-desk staff and student leaders, supervised by the research team, facilitated this welcome and informed-consent process, and not the advisers.[12]

12 Students who did not consent could still participate in the advising sessions. There were only eight students who did not consent to participate in the study. There were three students who were randomly assigned to the group-advising treatment group but who participated in a one-to-one advising session; since no consent was collected from these students, they were excluded from the study. There are no students in the analysis sample who received advising services that they were not assigned to, and no students in the control group who received any of the group or one-to-one advising services offered for the treatment groups.

The initial agenda for both one-to-one and group advising was exactly the same, and consisted of adviser and student introductions, the establishment of session goals (including eliciting questions from the student(s) and a transactional review of the important pre-entrance information students received in their acceptance package from the college. This session agenda ensured that students clearly understood the purpose of the advising session: to review and clarify the steps students needed to complete and be successful in their first semester at college. The advising approach (in both one-to-one and group sessions) was to ask the student(s) to share one big question they were hoping to have answered during the session. For the group sessions, this became the main agenda, and advisers noted anecdotally that answering these big questions took up most of the time. This process also coincidentally addressed many of the elements they planned on addressing in the resource documents. In one-to-one sessions, the process started off the conversations and helped transition the conversation to the resource documents. A copy of the agendas for both one-to-one and group advising sessions are included in Figures C.5 and C.6 in Appendix C.

Student and Program Characteristics by Control and Treatment Groups

Before looking at the effects of the intervention on student outcomes, we examine the characteristics of the control and treatment groups separately and test for differences. The sample we look at includes the whole cohort that was either a part of the control or treatment group and not just the participants in advising services offered. To test for differences in the distribution of characteristics, we run regressions for each of these characteristics on the treatment group indicators and perform t-tests on the coefficients for group-advising and one-to-one advising indicators**.**

Table A.1 (Appendix A) shows the proportions of students by gender, age, credential, school, regional status, student survey variables, high school average, and assessment scores for the control group and the differences in means for the treatment groups from the control group (in columns "Diff").

Generally, the randomization produced fairly equal distributions for student and program characteristics. There are some variables where the differences in means across groups are statistically significant, but some at the 10% level and the magnitudes of differences are not very large.

Pair-wise comparisons of the distributions of students according to credential, regional status, survey variables, career clarity and work over 15 hours a week, age, writing assessment score, math assessment score, and high school average suggest that the differences between the two groups are not statistically significant.

Some of the variables exhibit slight differences that are found to be statistically significant across the control and treatment groups. These are indicated with asterisks next to the differences. For example, the fraction of male students in group-advising is 3.1 percentage points lower, which is statistically significant at the 10% level, compared to the control group. While around 11% of the control group was enrolled in Media and Entertainment, the proportion of the one-to-one advising group enrolled in this school is 2.4 percentage points lower (significant at the 5% level).

3.3 Evaluation of Effects

The purpose of using random assignment to run an experiment is to provide comparable control and treatment groups. A simple comparison of outcomes for those in the control group and treatment group can yield an unbiased estimate of the causal effect of a treatment.

It is possible, though, that not all who were selected in the treatment group take up the treatment. This is referred to as non-compliance in the program evaluation literature.[13] In experiments where there is non-compliance, a simple comparison of mean outcomes between those who take up the treatment (participants) and those in the control group might not produce a reliable estimate for the effect of the treatment, as those who decide to take up the treatment are not randomly chosen but instead self-select into the program and, therefore, would likely differ from those in the control group in ways that can affect the outcome of the treatment.

One can still compare the outcomes of the control and treatment groups. However, since not all the treatment group members have actually received the treatment, this exercise uncovers not the causal effect of the treatment but the effect of assignment to the treatment group; that is, of the offer of the treatment. The randomness of the assignment ensures that the mean difference between the treatment and control groups represents an unbiased estimate of the offer of treatment. Such an estimate is known in the literature as the intention-to-treat (ITT) effect estimate. In this report, we will first focus on these ITT effects of the new academic advising interventions (group and one-to-one).

However, not all students who were randomly selected into one of the treatment groups took up the advising services they were offered. Since these students did not take up the services, there is no effect of these services for them, whereas those who took them up may have benefited from them. Therefore, the ITT effects likely understate the effect of new advising services for those who actually participated in them (Bloom, 1984).

ITT effects are relevant for making policy decisions about programs that can only offer a treatment but not require participation (Bloom, 2006). Moreover, the ITT effects will help us understand if these new advising interventions are promising for improving student outcomes even though they cannot provide an exact magnitude of the impact of these services on participants.

It is also possible to recover an unbiased estimate of the average causal effect of the treatment on those who actually participated in treatment, typically called the average treatment effect on the treated (ATET) using an instrumental variable approach. An instrumental variable should be correlated with the decision to take up early advising, but should not directly affect the outcome of interest (i.e., leaving early or participation in advising programs during the first term or year) given the decision to take up early advising. In other words, the instrumental variable should affect the outcome only through its relation to the decision to take up early advising.[14]

13 See Angrist and Pischke (2008).
14 This is referred to as exclusion restriction.

As first suggested by Bloom (1984), a natural instrumental variable in the case of randomized trials with non-compliance is the random assignment status.[15] The formula Bloom (1984) derives for the ATET is as follows:

$$E[Y_{1i} - Y_{0i}|T_i = 1] = \frac{E[Y_i|Z_i = 1] - E[Y_i|Z_i = 0]}{P[T_i = 1|Z_i = 1]}$$

The variables Y_{1i} and Y_{0i} denote the outcomes for when student i takes early advising and when he or she does not, respectively; T_i denotes whether student i takes up early advising (1 for take-up, 0 otherwise); Z_i denotes random assignment status (control versus group advising or one-to-one advising in this context), which will be used as the instrumental variable (Imbens & Angrist, 1994). $P[.]$ and $E[.]$ denote probability and expected value functions, respectively.

The formula implies that the average effect of early advising interventions on those who took up these services is equal to the ITT effect (i.e., the effect of offer of early advising services) on outcome,Y_i, divided by the compliance rate for those who were assigned to the treatment groups (group or one-to-one advising).

ATET is "typically the question of interest for developers of interventions who want to know what they can achieve by full implementation of their ideas." Conversely, this effect "may not be as policy-relevant as the first one [ITT], because rarely can treatment receipt be mandated" (Bloom, 2006, p. 8). That said, it is still worth estimating the effects on the actual participants because these effects give us a measure of how successful the advising interventions were for those who were sufficiently interested and motivated to take up these services. It should be emphasized, though, that these effects cannot be generalized to the entire population of students.

Putting these into a regression context, two-stage least squares (2SLS) estimates, where the instruments are the random assignment into group advising or one-to-one advising, will yield estimates for the ATET (Bloom, 1984; Imbens & Angrist, 1994). We begin by reporting the ITT effects, which are followed by 2SLS estimates of the ATET.

4. Results

This section presents the estimates for the effects of interventions on one-term and one-year measures for leaving rates and advising participation.

4.1 Intention-to-treat (ITT) Effects of the Advising Interventions

One-term and One-year Leaving Rates

Table A.2 (Appendix A) shows the estimates for the average causal effects of the offer of group and one-to-one advising services relative to the established advising practices on one-term and one-year leaving rates. Figure 1, below, shows the leaving rates for the control and treatment groups.

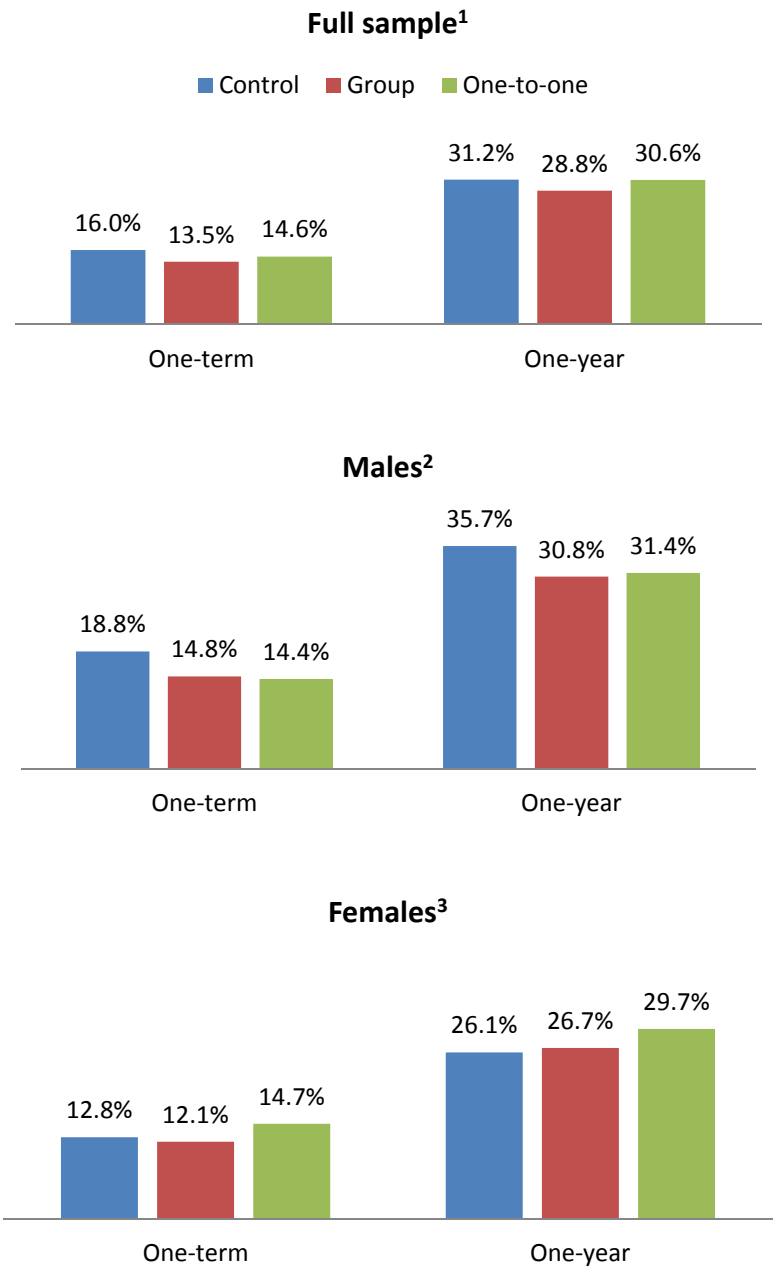
15 The control group should not be exposed to any treatment. For more detail, see Bloom (1984) and Angrist and Pischke (2008).

The results presented in Table A.2 and Figure 1 are for the full sample and are broken down by gender. The first row of each set of results in Table 2 refers to the leaving rates (one-term or one-year) for the control group. Around 16% of the students in the control group left before the second semester.[16] This figure differs significantly for males and females with males having a leaving rate of around 19%, which is 6 percentage points higher than that for females.

The first and second rows of the "Group Advising Difference" and "One-to-one Advising Difference" in Table A.2 show the coefficient estimates and standard errors for the differences in the leaving rates for those who were offered participation in the group or one-to-one advising sessions compared to the control group. The first columns for each set of estimates (full sample, males, and females) show the results from regressions that do not include any control variables, and the next columns include all the control variables in the models.[17]

16 The previous-year one-term and one-year leaving rates were 16.3% and 30.4%, respectively.
17 The control variables include school, credential, gender, regional status, student survey variables (career clarity, transition, confidence, educational commitment, work over 15 hours, age, assessment scores (in reading, math and writing), and high school average.

Figure 1: Leaving Rates of Control and Treatment Groups



[1] For the full sample, the difference in leaving rates between the control group and group advising (2.5 percentage points) for one-term leaving rates is statistically significant at the 5% level. Other differences between control and treatment groups are not statistically significant.

[2] For males, the differences in leaving rates for the group advising (4 and 4.9 percentage points for one-term and one-year) and one-to-one advising for one-term rates (4.4 percentage points) are statistically significant at the 5% level, while the difference in one-year leaving rate for the one-to-one advising (4.3 percentage points) is statistically significant at the 10% level.

[3] For females, none of the differences in leaving rates between control and treatment groups are statistically significant.

For the full sample, we find that compared to the control group, those who were assigned to group-advising sessions had a first semester leaving rate that was around 2.5 percentage points lower; we do not see any statistically significant effect for those in the one-to-one advising sessions. The results by gender show that the group-advising effects seen for the full sample were driven by males who had sizeable and statistically significant effects, whereas females had small effects that were not statistically significant.

The estimates suggest significant ITT effects of the group and one-to-one advising services on one-term and one-year leaving rates for males. Conversely, we did not find any statistically significant effect for females.

For males, the effects of being assigned to group and one-to-one advising are statistically the same. Those who are in group or one-to-one advising had a one-term leaving rate that is around 4 percentage points lower than that of the control group. This corresponds to a relative difference of around 21% between the control group and the group advising or one-to-one advising. For females, the estimates for effects of being assigned to one-to-one advising are positive and not as small in magnitude as those for group advising, but they are still not statistically significant.

The next panel in Table A.2 shows the estimates for effects on one-year leaving rates. Full sample effects for group advising are again driven by large and significant effects for males who had a 4.9 percentage-point difference in leaving rates. These correspond to a relative difference in the one-year leaving rate of around 14% compared to the control group. For females, the estimates of the effect of being assigned to one-to-one advising are positive, but are not statistically significant.

Interestingly, most of the effects on leaving for males are concentrated in the first semester, and the one-year differences are not as pronounced as the one-term differences.

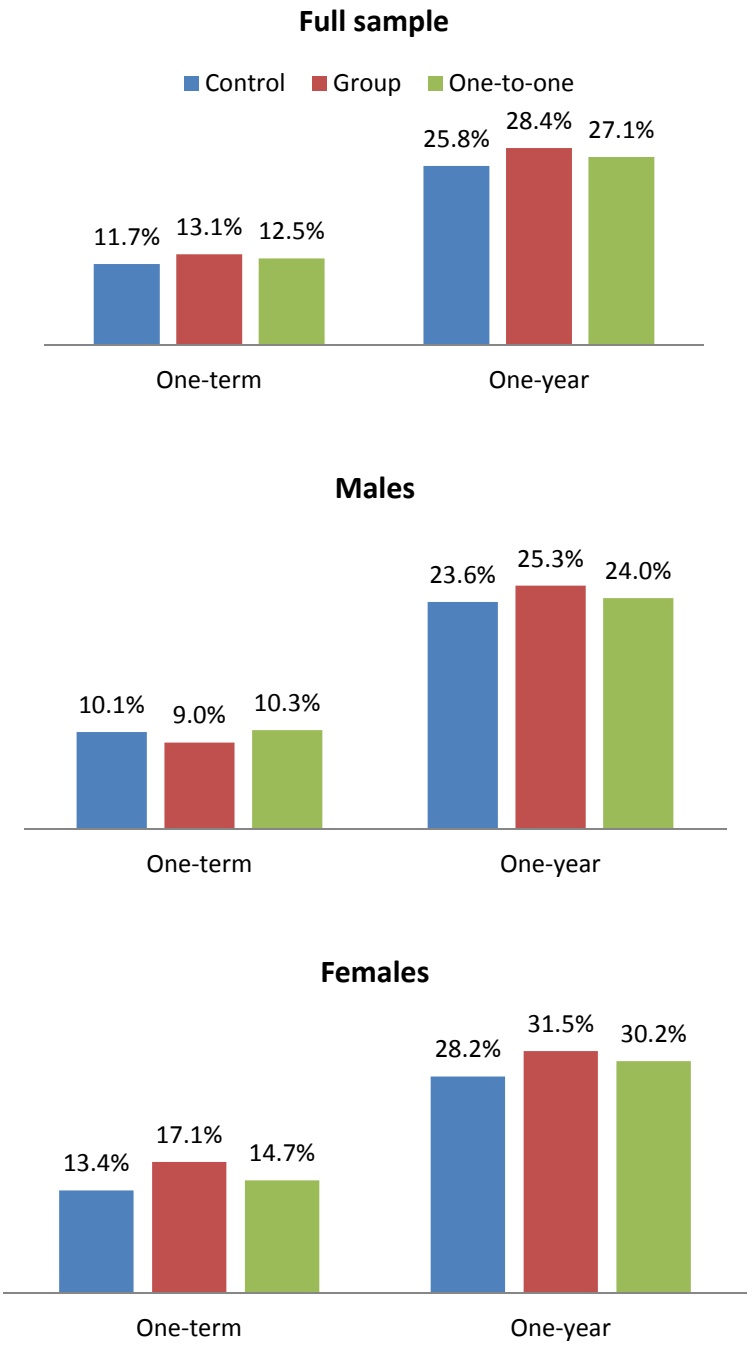
The results by SRCs are shown in Table A.3 (Appendix A). The magnitude of the estimated effects of group advising is larger for high-risk students compared to low- and medium-risk students. High-risk students in group advising sessions were around 4.8 percentage points less likely (significant at the 10% level) to leave, while low- and medium-risk groups were 2 and 0.4 percentage points, respectively, less likely to leave compared to the control group. This pattern is not very clear when the effects are broken down by gender.

For one-year leaving rate effects, the estimated negative effects are larger in magnitude for low-risk males (both for group and one-to-one advising) compared to medium- and high-risk males. However, the estimated effect is statistically significant only for the group advising. Low-risk males who were in group advising had a one-year leaving rate that was 9.8 percentage points lower (significant at the 5% level) compared to those in the control group.

One-term and One-year Advising Participation Rates

Table A.4 (Appendix A) shows the estimates for effects on one-term and one-year advising participation rates. Like the leaving rate estimates reported above, these represent the intention-to-treat effects of the new advising services. Figure 2, below, shows the advising participation rates for the control and treatment groups.

Figure 2: Advising Participation Rates of Control and Treatment Groups[1]



[1] For females, the difference in one-term advising participation rates between the control group and group advising (3.7 percentage points) is statistically significant at the 5% level Including control variables in the model, the difference is estimated as 3.4 percentage points and is statistically significant at the 10% level. None of the other differences between the control and treatment groups are statistically significant.

For the full sample, advising participation rate during the first semester is about 12% for the control group. Around 10% of males and 13% of females in the control group participated in advising sometime during their first semester.[18]

The point estimates for the overall effects on one-term advising participation rates are positive and larger for group advising, but the estimates are not statistically significant. The results by gender show positive effects of group advising for females, whereas for males the estimates are negative, but not statistically significant.[19] The female group advising effects are 3.4 to 3.7 percentage points higher than the control group, a relative difference of 25% to 28%. In contrast, there is no statistically significant difference in one-term advising participation rates for those who were assigned to one-to-one advising services compared to those in the control group.

The one-year advising participation rate is 26% for the control group, 24% for males and 28% for females in the control group. We find positive point estimates for group advising and one-to-one advising for males and females, but none of them are statistically significant.

The results by SRCs are given in Table A.5 (Appendix A). The point estimates for low-risk students are generally negative, but not statistically significant except for males. Low-risk males who were assigned to group advising participated in advising services during the first term and first year at rates 4.8 and 6.5 percentage points (statistically significant at the 10% level), respectively, lower compared to low-risk males in the control group.

For the medium- and high-risk groups, the point estimates are all positive (except for males). One place we see a statistically significant difference is in high-risk females who were offered group advising; they had a one-term advising participation rate 6.7 percentage points higher (a difference by around 40%) than the females in the control group. The other place is medium-risk males who were offered group advising. Their one-year advising participation rate was 9.6 percentage points higher (a relative difference by around 55%) compared to the medium-risk males in the control group.

To summarize, the main findings suggest the advising interventions resulted in significant improvements in retention, especially over the first term, with large and significant effects for male retention. There were no significant effects for females. In contrast, females saw large effects from the availability of group advising on their one-term advising participation, while male advising participation was unaffected. There were no clear and consistent patterns for the effects on leaving and advising participation by risk categories.

18 The number of contacts (any type of contact — in-person and/or via email) made to advising services during the fall range between one and 15 with 61% of the students who participated in advising (a total of 585 students) making contact only once, 22% making contact twice and 9% making contact three times. The number of in-person contacts (one-to-one appointment, drop-in appointment, group appointment, phone) made to advising services during the fall range between one and 13 with 75% making contact only once, 16% making contract twice, and 5% making contact three times. The number of contacts during the first year range between one and 41 with 56% making contact only once, 23% making contact twice and 10% contacting three times. The number of in-person contacts during the first-year range between one and 39 with 65% making contact once, 22% making contact twice, and 8% making contact three times.

19 The general pattern of results for the effects on the number of all advising contacts and in-person advising visits are similar to those found for the advising participation rates, with the exception of one-to-one advising effects on number of all and in-person contacts made to advising services over the first year for males (see Tables B.1 and B.2). The average number of all and in-person visits by males in one-to-one advising are 0.14 and 0.15, respectively, higher (compared to averages of 0.47 and 0.40 for the control group), but these estimates are not statistically significant.

High leaving rates for males could be one of the reasons for the large effects. The offer of early advising brought the gap in one-term leaving rates between males and females from 6 to 2 percentage points. Improved retention for males with in-term advising participation did not change as a result of the offer of early advising services. This could indicate that most of what male students needed for better outcomes was a one-time boost in support and information early in their time at the college. The underlying reasons for improved retention are still unknown and future research could identify if it is related to better preparation, motivation, a sense of belonging, connection to the college or other reasons. For females, the story could be a little different. Their leaving rates are not as high as males, which might have bound the effects of the interventions on leaving because there is not as much room to improve as with males.[20] Future research, including qualitative data, could provide greater insight into the differences between males and females.

4.2 Average Treatment Effects of Group and One-to-one Advising on the Treated (ATET)

One-term and One-year Leaving Rates

As described in Section 3.3, the point estimates for ATET are simply a multiple of the ITT effect estimates presented in Table A.2, where the multiplier is the reciprocal of the compliance rate; that is, the fraction of students who participated in the early advising services offered (Appendix A, Table A.6). Table A.7 shows the estimates of average effect of group and one-to-one advising services on those who participated.

As mentioned before, the ITT effect estimates are diluted by non-compliance.[21] Therefore, by definition, the ATET estimates are larger in magnitude when compared to the ITT effects. Given that the compliance rates for this experiment are very low (between 15.3% and 22.4% as shown in Table A.6), the estimated effects on participants are significantly larger than the ITT effects shown in Table A.2.[22]

The estimates for the effects on one-term leaving rates for males who participated in group and one-to-one advising services are 25.7 and 19.4 percentage points, respectively lower than what their leaving rate would have been if they had not participated in these services (as shown in Table A.7). Here the leaving rates for the participants are not compared to those in the control group as in Table A.2, as these two groups are likely not similar in terms of their characteristics.

Given a negative effect size of around 25.7 percentage points for one-term leaving rates for males in group advising, it is estimated that the leaving rate for males in the absence of group advising services would have been 38.1% (= 12.4 + 25.7), where 12.4% is the one-term leaving rate for males who participated in group advising (see Table A.8). Similarly, given an effect size of around 19.4 percentage points on the one-term

20 Some of the other examples of studies reporting on gender differences in the effectiveness of interventions designed to improve postsecondary student outcomes are Angrist et al. (2009) and Bettinger and Baker (2014). Angrist et al. (2009) found larger effects on females' academic performance of an intervention combining support services (mentoring by upper-year students) and cash awards, whereas Betting and Baker (2014) found larger effects on male retention of coaching services (by phone).

21 Non-compliance in the treatment group could have resulted either from students not having read their emails or checked their voicemails or simply because they did not want to participate in the early advising services they were offered. However, we believe it is unlikely that students did not see the emails about early group or one-to-one advising services, since these emails were sent three times. Therefore, non-compliance is probably mostly a result of some students not being willing to participate in the services offered.

22 For example, a compliance rate of 20% would yield an ATET estimate four times (= 1/0.2 - 1) as large as the ITT effect.

leaving rate for males in the one-to-one advising group, it is estimated that the leaving rate for these students would have been 28.2% (= 8.8 + 19.4) if they had not participated in one-to-one advising.[23]

The effects for one-year leaving rates for males are 32.8 and 19 percentage points for group and one-to-one advising, respectively. There are no statistically significant effects for females.

By definition, the results for ATET by SRCs follow the same story as described for the ITT effects by SRCs in Section 4.1 — only the magnitudes of the effect differ. These results are given in Table B.3 in Appendix B.

One-term and One-year Advising Participation Rates

Table A.9 shows the ATET estimates for one-term and one-year advising participation rates. Again, the story is the same as described in Section 4.1, only the magnitudes of effect are different by the order of the reciprocal of compliance rates in the relevant groupings (i.e., males, females, group or one-to-one advising).

There are positive effects (20.3 to 22 percentage points) of group advising on the one-term advising participation rate for female participants, whereas for males the effects are negative, but not statistically significant. There is no statistically significant difference in one-term advising participation rates for those who participated in one-to-one advising services, and there is no significant effect on the one-year advising participation rates. The effects by SRC are shown in Table B.4 in Appendix B.

5. Discussion

Evaluating the Effects of Academic Advising Interventions on Student Outcomes

This paper represents the second phase of a broader research project that aims to evaluate the effects of two approaches to academic advising. The differences in these approaches include degrees of "intrusiveness," or how students are contacted and the available services offered, as well as the nature of the proactive advising services offered, including one-to-one versus group sessions.

One of the purposes of the broader project is to estimate the effects of the advising initiatives overall, and also across students at different risk levels of leaving Mohawk College early (i.e., without graduating). Students are categorized into three risk groups (low, medium and high), also referred to as Student Risk Classifications (SRCs) throughout the report, which are derived from the predictive models for one-term and one-year leaving.[24]

We report two sets of estimates for the effects of the interventions: intention-to-treat (ITT) and average treatment effect on the treated (ATET). The ITT effects represent the causal effect of the offer of treatment or assignment to the treatment group (Section 3.3).

23 One thing to note here is these values for the ATET estimates rely on the assumption that random assignment affects student outcomes only through their effect on the decision to participate in the group and one-to-one advising services. This point is elaborated further under Limitations and Avenues for Further Research in the Discussion section.
24 The predictive models for one-term and one-year leaving were developed in the first and second phases of this research project, respectively.

The ATET represent the effects of the advising interventions on the outcomes of those who decided to take up the services offered. The estimation of these effects relies on using instrumental variables to control for self-selection regarding the decision to take up the services. In this context, the ATET is a multiple of the ITT, where the multiplier is the reciprocal of the fraction of students who decided to take up the services. Therefore, by definition, the ITT effects are always smaller in magnitude than the ATET estimates (Section 3.3).

In this report, we mostly focus on the ITT effects of the academic advising interventions (group and one-to-one advising services, and a more intrusive outreach) since these effects have a clear causal interpretation. In contrast, the validity of the ATET estimates as the causal effects of the advising interventions relies on the assumption that there are no direct impacts of the outreach emails on student outcomes. Therefore, the ATET could be either exaggerated or underestimated depending on the direction of the effects of outreach emails on outcomes, which cannot be tested with the data available.

Key Findings

The key findings can be summarized as follows:

- The offer of proactive group advising improves overall retention over one-term by 2.5 percentage points, while one-to-one advising has no statistically significant effect on either one-term or one-year retention.
- The offer of proactive advising improves retention for males, whereas there are no statistically significant effects for females.
- Males who were offered either of these advising services were around 4 percentage points less likely to leave during the first semester compared to a leaving rate of 18.8% for the control group.
- The one-year effects of group advising for males, driven mainly by the low-risk students, were only slightly higher (by 1 percentage point) than the one-term effects, indicating that the effects are concentrated in the first semester. The one-year effects for one-to-one advising were the same as one-term effects.
- There were no clear and consistent patterns for the effects on leaving by the student risk categories.
- Women who were offered group advising saw their adviser in the first semester at higher rates (3.4 to 3.7 percentage points higher compared to a rate of 13.4% for the control group). In contrast, neither female advising participation rates during the first year nor male participation rates over either interval were affected by the offer of either group or one-to-one advising services.
- By student risk categories, the positive one-term advising participation effects of group advising for females seem to be driven mainly by high-risk females. In contrast, low-risk males saw negative effects on their participation rates for group advising over both time intervals, while medium-risk males saw positive effects on their one-year advising participation rates.

Limitations

The analysis presented in this report has two limitations. First, the validity of the ATET estimates as the causal effects of the advising interventions being evaluated on the effects of those who take up the advising being offered relies on the assumption that the instrumental variables (i.e., the indicators for being assigned to one of the treatment groups) used to control for the decision to take up the services offered affect the

outcomes only through their impact on the decision to take up the services.[25] It is therefore important to think about the potential direct impacts of the outreach emails on student outcomes, including retention. To the degree there are such effects, the estimated ATET effects are exaggerated. In contrast, the ITT estimates are perfectly reliable, since they make no such assumptions and rest only on simple comparisons between the experimental and control groups.

The emails the treatment and control groups received differ in one respect, other than their frequencies. The treatment groups received information about advising services that were available before the term started and also a lot of encouragement to attend these early advising services. It is possible that some of this encouragement specific to early advising spilled over to in-term advising services, directly (i.e., not only through early advising) motivating some students to attend in-term advising and/or making some students feel more connected to the college. In contrast, some students may have felt the opposite and the emails may have had a negative effect on their outcomes. This would render the instrument invalid, leading to biased ATET estimates for both outcomes of interest (one-term and one-year advising and leaving outcomes).

Unfortunately, it is not feasible to test whether these direct channels between the receipt of emails and outcomes exist. In future work, one way to test this could be to administer a survey which asks about students' experiences after receiving these emails, what students thought about the emails, whether they felt more or less motivated to pursue their studies and/or attend the advising services during the term or year. This would help us assess whether there could be any direct effects of the more intrusive outreach approach (i.e., the random assignment to any of the treatment groups) on student outcomes.

Second, the analysis does not control for differences in the nature of advising services each student received. There could be differences in the quality of advisers that could influence the effectiveness of the interventions.

Third, it is not possible to know to what degree the results found here for an experiment involving one particular outreach and advising program on one set of incoming students at one college can be generalized and applied to other students, other colleges and other programs. That said, the findings presented in this paper seem to point to the interventions tested here being potentially cost-effective measures of improving student success, so other experiments of this type may well be worth trying.

Implications for Mohawk College

There are a number of important implications for Mohawk College arising from these findings. First, proactive communications and advising, particularly before school starts, is an important strategy to embed into regular operations because it makes a significant difference to student success.

Students who were offered proactive group advising had a leaving rate that was 2.5 percentage points lower compared to the control group, while there were no effects of one-to-one advising on overall leaving rates.

25 A valid instrumental variable should affect the outcome of interest only through its effect on the endogenous variable to help identify its causal effect on the outcome (Angrist & Pischke, 2008).

In other words, after one term, those in group advising had a leaving rate of 13.5% compared to a 16% leaving rate for the control group; an overall improvement in the leaving rate by 15.6%. This is important because the central purpose and goal of higher education is to support students in completing their academic credentials.

Second, we learned that proactive service delivery makes a difference to men, who tend to be more at risk of leaving the college before graduating than women. Pairing this lesson with the ability to identify those most at risk through the predictive model developed in the previous stages of the research project offers a powerful opportunity to start making a meaningful difference to student success well before students arrive at the college.

The equal impact of group and one-to-one advising for males is another important lesson that has practical value. Group advising represents a more efficient approach to service delivery, which allows administrators to support more students earlier in their time at the college. This efficiency lesson also relates to the last implication of this research, and that is its financial impact.

An effective retention strategy will have a positive impact on institutional budgets and improve financial sustainability. Programs and services that can demonstrate improvements to student retention can make meaningful financial arguments and demonstrate their value to the institution. To calculate the financial impact of this program, we simply need to know how many students this intervention prevented from dropping out and multiply that by the revenue they generate for the college.

We know that 2.5% of those who were offered group advising (a total of 1,614 students) were retained when they otherwise would have dropped out of college before the second term; this amounts to approximately 40 students. In other words, a 2.5 percentage-point improvement in retention is actually quite a large increase. If this proactive advising intervention were scaled up to be a regular part of the operations of the college, then it is likely that many more students could be retained.

Although we cannot say for certain that these effects can be generalized to other incoming students, offering the proactive group advising services to a whole cohort of future incoming students could potentially save three times the number of students retained by the group-advising experiment tested here. While this may seem like a crude analysis, especially when the spirit of the advising intervention is to improve student success, the pressures on administrators to increase enrolments to sustain budgets is always present.

There are also fiscal benefits resulting from this experiment. Students who make it through college will have higher earnings, which will generate increased tax revenues for governments. They will also be less likely to draw on government support programs such as social assistance and employment insurance, and perhaps even health services.

Conclusions and Avenues for Future Research

Colleges have an important role in the higher education landscape, namely providing broad access to students who may not otherwise receive a postsecondary education. At Mohawk, this number is estimated to be about 25% to 35% of the full-time population. Supporting students from diverse demographic and

socioeconomic backgrounds is a cornerstone of college academic and student services programs. Producing evidence on the efficacy of these programs is equally as important. This project contributes new evidence on the use of proactive advising in the college environment.

Mohawk was interested in testing the effect of proactive one-to-one and group advising interventions. The findings suggest that offering proactive advising matters for the leaving outcomes of males and female advising participation rates. Similar effects of the offer of group and one-to-one advising on male one-term leaving outcomes and larger effects of group advising on female advising participation rates, suggest that offering group advising could be a promising practice to improve student outcomes in a cost-effective manner. Such an approach allows an institution to reach a greater number of students at risk of leaving early with limited staffing resources.

This project points to a number of directions for future research opportunities. First, replicating this project with future cohorts of students at Mohawk College and at other colleges would, if found to yield similar findings, validate the findings reported in this paper. The results of such experiments would likely be of considerable interest to a broad group of college, student-affairs, and academic-advising stakeholders.

Second, the channels by which the test programs were offered could be assessed by administering a survey that asks students what they thought about the emails, whether they felt more or less motivated to pursue their studies and/or attend advising services offered during the term or year, and how the emails changed their experiences or behaviour. These could also be looked at by other demographic variables not studied in this paper such as socioeconomic status, ethnicity, parental education, etc. This would help us assess whether there could be any direct effects of the more intrusive outreach approach (i.e., the random assignment to one of the treatment groups) on student outcomes such as improving their motivation, as opposed to their working through their participation in the advising programs offered per se.

A survey of this type could also provide insight into what particular aspects of the proactive advising made a difference to students, and why the effects were so different for men and women. Similarly, advisers could also be surveyed or interviewed about their experiences, observations and lessons learned about student needs.

Third, there is strong evidence to suggest that comprehensive support such as bundling support programs like the City University of New York's ASAP initiative (Scrivener et al., 2015) and the principles of broad institutional reform such as the Guided Pathways initiative (Bailey et al., 2015), make the greatest impact on student success. These often include mandatory participation in advising programs, encourage full-time enrolment, and offer financial incentives such as bus passes, textbooks and tuition, which address common barriers to student success and ease the student experience. Mohawk could bundle some of these programs and services, or perhaps others they have tested such as Future Authoring (Finnie et al., 2017b), into a more comprehensive suite of proactive advising support practices, put these in place and evaluate their effects.

Fourth, extending proactive advising more formally with emails and phone calls into the first and subsequent semesters could also be tried. Such practices could have a greater impact on student success than the pre-term contact tested here.

Overall, this report concludes the second phase of the predictive modelling and proactive advising project. It also serves as the third of three reports about collaborative work undertaken by Mohawk College and EPRI as part of HEQCO’s Access and Retention Consortium. While many lines of future research have been highlighted, proactive outreach and advising support before classes start is a promising practice for Mohawk College and could be equally promising on other campuses too.

Definitions

Assessments for Success (AFS) are the reading, writing and mathematics post-admission, pre-registration placement tests new students take during their transition to college. Based on the results of their assessments, students are placed in either regular or remedial communications or mathematics courses. They are also provided resources and support for any upgrading necessary prior to the start of classes.

Average treatment effect on the treated (ATET) captures the effect of receiving the treatment offered on those who take up the treatment.

High-risk category represents the students who constitute the top third of the predicted probability of leaving distribution. This group of students is least likely to succeed and more likely to leave college after one term, and therefore needs the most support and intervention. At the beginning of the project, this group was named "At-risk."

Instrumental variables are random variables that aid in the estimation of causal relationships when there is a suspicion of self-selection or endogeneity in at least one of the explanatory variables in the outcome regression. In the context of this project, this refers to the take-up of treatment.

Intention-to-treat effect (ITT) refers to the causal effect of the offer of treatment, which is arrived at by calculating the difference between the mean outcomes for the treatment and control groups.

Intrusive/proactive advising refers to the approach introduced by Glennen (1975), which calls for more deliberate advising interventions and supportive advising relationships to enhance student motivation. More recently, this approach has been known as proactive advising (Varney, 2013), which encourages proactive outreach, offering support before a student needs it, and fostering strong relationships between an adviser and a student.

Lifecycle advising refers to the many cyclical elements of a student's experience in college. From semester to semester or year to year, there are predictable activities, deadlines, challenges and experiences that occur routinely (i.e., registration, payment deadlines, midterms and finals) that constitute the lifecycle of a college student. The various activities that recognize, respond to and support a student through those common experiences constitute lifecycle advising.

Low-risk category represents the students who constitute the bottom third of the predicted probability of leaving distribution. This group of students is most likely to succeed and least likely to leave college after one term and, therefore, needs the least support. At the beginning of the project, this group was named "College Ready."

Medium-risk category represents the students who constitute the middle third of the predicted probability of leaving distribution. This group of students is in the middle in terms of being likely to succeed and/or to leave college after one term. At the beginning of the project, this group was named "Underprepared."

Non-compliance refers to those who are assigned to a treatment group and who decide not to take up that treatment.

Predictive model is an output of the predictive modelling process that is used to predict an outcome of interest given the values for predictor variables. In the context of this project, it refers to the regression model specification used to predict the probability of a student leaving college after one term and after one year (Finnie et al., 2017a).

Student Entrance Survey (SES) is the post-admission, pre-registration survey that the majority of new students take as part of their transition to college. It is administered on campus at the same time as the Assessments for Success (AFS).

Student Risk Classifications (SRCs) refer to the low-, medium- and high-risk categories of students across the full distribution of risk levels (produced by the predictive model). The cut-off points were chosen so that the students were equally divided across the distribution and each group had 33.3% of the student population.

Student Success Adviser (SSA) refers to a full-time support staff position at Mohawk College. SSAs are professional advisers designated as the first point of contact for students across a broader academic area. Though SSAs are physically embedded in the staff offices of the academic area they support, they are centrally coordinated by and report to Student Success Initiatives, a department within Student and Alumni Services.

References

Angrist, J., Lang, D., & Oreopoulos, P. (2009). Incentives and services for college achievement: Evidence from a randomized trial. *American Economic Journal: Applied Economics, 1*(1), 136–163.

Angrist, J., Oreopoulos, P., & Williams, T. (2014). When opportunity knocks, who answers? New evidence on college achievement awards. *Journal of Human Resources, 49*(3), 572–610.

Angrist, J. D., & Pischke, J. S. (2008). *Mostly harmless econometrics: An empiricist's companion*. Princeton, NJ: Princeton University Press.

Astin, A. W. (1997). How "good" is your institution's retention rate?. *Research in Higher Education, 38*(6), 647–658.

Austin, M., Cherney, E., Crowner, J., & Hill, A. (1997). The forum: Intrusive group advising for the probationary student. *NACADA Journal, 17*(2), 45–47.

Bailey, T., Jaggars, S. S., & Jenkins, D. (2015). What we know about guided pathways. *Community College Research Center*. New York, NY: Columbia University.

Banta, T. W., Hansen, M. J., Black, K. E., & Jackson, J. E. (2002). Assessing advising outcomes. *NACADA Journal, 22*(1), 5–14.

Bentley-Gadow, J. E., & Silverson, K. (2005). The sequential advising model for group advising: Modifying delivery venues for freshmen and transfer students. *NACADA Clearinghouse of Academic Advising Resources*. Retrieved from http://www.nacada.ksu.edu/Resources/ClearingHouse/View-Articles/Group-Advising-Model.aspx

Bettinger, E. P., & Baker, R. B. (2014). The effects of student coaching: An evaluation of a randomized experiment in student advising. *Educational Evaluation and Policy Analysis, 36*(1), 3–19.

Bloom, H. S. (1984). Accounting for no-shows in experimental evaluation designs. *Evaluation Review, 8*(2), 225–246.

Bloom, H. S. (2008). The core analytics of randomized experiments for social research. In P. Alasuutari, L. Bickman & J. Brannen (Eds.), *The Sage handbook of social research methods* (pp. 115–133). London: Sage Publications.

Braxton, J. M., Doyle, W. R., Hartley III, H. V., Hirschy, A. S., Jones, W. A., & McClendon, M. K. (2014). *Rethinking college student retention*. San Francisco, CA: Jossey-Bass.

Center for Community College Student Engagement. (2014). A matter of degrees: Practices to pathways (High-impact practices for community college student success). Austin, TX: The University of Texas at Austin, Program in Higher Education Leadership.

Creamer, E. G., Creamer, D. G., & Brown, K. S. (2003). Applying quality educational principles to academic advising. In G. L. Kramer & Associates (Eds.), *Student academic services: An integrated approach* (205–222). San Francisco, CA: Jossey-Bass.

Crockett, D. S. (1978). *Academic advising: A resource document*. Retrieved from http://files.eric.ed.gov/fulltext/ED189906.pdf

Dietsche, P. (2007). *Pan-Canadian study of first year college students: Student characteristics and the college experience, Report 1*. Gatineau, QC: Association of Canadian Community Colleges/Human Resources and Social Development Canada. Retrieved from https://pseinfosys.com/wp-content/uploads/2014/02/Dietsche-ACCC-2008.-Pan-Canadian-Study-of-First-Year-College-Students-1.pdf

Dietsche, P. (2008). *Pan-Canadian study of first year college students: The characteristics and experience of Aboriginal, disabled, immigrant and visible minority students, Report 2*. Gatineau, QC: Association of Canadian Community Colleges/Human Resources and Social Development Canada. Retrieved from https://pseinfosys.com/wp-content/uploads/2014/02/Dietsche-ACCC-2008.-Pan-Canadian-Study-of-First-Year-College-Students-2.pdf

Dietsche, P. H. J. (2012). Use of campus support services by Ontario college students. *Canadian Journal of Higher Education*, *42*(3), 65–92.

Drake, J. K., Jordan, P., & Miller, M. A. (2013). *Academic advising approaches: Strategies that teach students to make the most of college.* San Francisco, CA: Jossey-Bass.

Ellingham, S., Fernandez, D., & Fricker, T. (2016). CACUSS' integrated academic and professional advising CoP better defining advising in Canada. *CACUSS Communiqué*, 18-19. Retrieved from https://issuu.com/cacuss/docs/communique_oct_2016

Fricker, T. (2015). The relationship between academic advising and student success in Canadian colleges: A review of the literature. *College Quarterly*, *18*(4).

Fricker, T., Doyle, H., Ellingham, S., & Fernandez, D. (2016). Advising in Canada: Summary survey results. *CACUSS Communiqué*, 34-37.

Finnie, R., Poirier, W., Bozkurt, E., Fricker, T., Pavlic, D. (2017a). *Using predictive modelling to inform early alert and intrusive advising interventions and improve retention*. Toronto, ON: Higher Education Quality Council of Ontario.

Finnie, R., Poirier, W., Bozkurt, E., Peterson, J. B., Fricker, T., Pratt, M. (2017b). *Using future authoring to improve student outcomes*. Toronto, ON: Higher Education Quality Council of Ontario.

Glennen, R. E. (1975). Intrusive college counseling. *College Student Journal*, *9*(1), 2–4.

Gordon, V. N., & Steele, G. E. (2015). The undecided college student: An academic and career advising challenge. Springfield, IL: Charles C. Thomas, Ltd.

Grahn, J. (1982). A faculty team approach to group advising. *General College Studies, 17*(1), 1–31.

Grayson, J. P., & Grayson, K. (2003, December). *Research on retention and attrition*. Canada Millennium Scholarship Foundation. Retrieved from https://www.tru.ca/__shared/assets/Grayson_2003_research_on_retention_and_attrition23683.pdf

Grites, T. J. (1979). Academic advising: Getting us through the eighties (AAHE-ERIC Higher Education Research Report No. 7). Washington, DC: American Association of Higher Education.

Habley, W. R., Bloom, J. L., & Robbins, S. (2012). *Increasing persistence: Research-based strategies for college student success*. San Francisco, CA: Jossey-Bass.

Hollins, T. (2009). Examining the impact of a comprehensive approach to student orientation. *Inquiry: The Journal of the Virginia Community Colleges*, *14*(1), 15–26. Retrieved from http://commons.vccs.edu/inquiry/vol14/iss1/3

Imbens, G., & Angrist, J. (1994). Identification and estimation of local average treatment effects. *Econometrica, 62*(2), p. 467-475.Jordan. P. (2000). Advising college students in the 21st century. *NACADA Journal, 20*(2), 21–30.

King, M. C. (Ed.). (1993). Academic advising: Organizing and delivering services for student success. In *New Directions for Community Colleges* (pp. 47–54). San Francisco, CA: Jossey-Bass.

King, M. C. (2008). Organization of academic advising services. In V. N. Gordon, W. R. Habley & T. J. Grites (Eds.), *Academic advising: A Comprehensive handbook (2nd ed.)* (pp. 242-252). San Francisco, CA: Jossey-Bass.

King, N. (2000). Advising students in groups. In V. N. Gordon, W. R. Habley & T. J. Grites (Eds.), *Academic advising: A Comprehensive handbook* (p. 236). San Francisco, CA: Jossey-Bass.

Kuh, G. D. (2004). Student engagement in the first year of college. In M. L. Upcraft, J. N. Gardner & B. O. Barefoot (Eds.), *Challenging and supporting the first-year student: A handbook for improving the first year of college* (pp. 86–107). San Francisco, CA: Jossey-Bass.

Light, R. L. (2001). *Making the most of college: Students speak their minds*. Cambridge, MA: Harvard University Press.

Lynch, M. L., & Stucky, K. (2001). Advising at the millennium: Advisor roles and responsibilities. *NACADA Journal, 21*(1-2), 15–31.

Morisano, D., Hirsh, J. B., Peterson, J. B., Pihl, R. O., & Shore, B. M. (2010). Setting, elaborating, and reflecting on personal goals improves academic performance. *Journal of Applied Psychology*, *95*(2), 255.

Niles, S. G., & Harris-Bowlsbey, J. A. (2002). *Career development interventions in the 21st century*. Upper Saddle River, NJ: Merrill Prentice Hall.

Nutt, C. L. (2000). One-to-one advising. In V. N. Gordon and W. R. Habley (Eds.), *Academic advising: A Comprehensive handbook* (pp. 200–227). San Francisco, CA: Jossey-Bass.

Ontario Academic Advising Professionals. (n.d.). Terms of reference. Retrieved from http://oaap.ca/terms-of-reference/

Pardy, L. (2016). *Academic advising in British Columbia.* British Columbia Council on Admissions and Transfer. Retrieved from http://www.bccat.ca/pubs/academicadvising.pdf

Poirier, W. J. (2015, June). Deliberate orientation and transition practices as part of a broader student success strategy: A comparative study of three large urban Ontario colleges (thesis). Toronto: Ontario Institute for Studies in Education, University of Toronto. Retrieved from http://hdl.handle.net/1807/69456

R. A. Malatest & Associates Ltd. (2009, December). *FINAL impacts report: Foundations for success project*. Retrieved from http://malatest.com/CMSF%20FFS%20-%20FINAL%20Impacts%20Report.pdf

Ryan, B. (2010). Integrating group advising into a comprehensive advising program. *Academic Advising Today, 33*(1).

Sanchez, L. M. (2008, July 2). Two's company, three's a crowd: Can group advising be appreciative and effective? *The Mentor*. Retrieved from https://dus.psu.edu/mentor/old/articles/080702ls.htm

Sanford-Harris, J. L. (1993). Advising the two-year student: Considerations and strategies. *New Directions for Community Colleges, 82*, 75–82. doi: 10.1002/cc.36819938209

Scrivener, S., & Weiss, M. J. (2013). More Graduates: Two-year results from an evaluation of accelerated study in associate programs (ASAP) for developmental education students. New York, NY: MDRC.

Scrivener, S., Weiss, M. J., Ratledge, A., Rudd, T., Sommo, C., & Fresques, H. (2015). Doubling graduation rates: Three-year effects of CUNY's Accelerated Study in Associate Programs (ASAP) for developmental education students. New York: MDRC.

Stark, K. (2002, September 16). Advising undecided students: What works best? *The Mentor*. Retrieved from https://dus.psu.edu/mentor/old/articles/020916ks.htm

Statistics Canada. Table 051-0001 *Estimates of population, by age group and sex for July 1, Canada, provinces and territories, annual* (table), CANSIM (database). Last updated September 28, 2016.

http://www5.statcan.gc.ca/cansim/a26?id=510001 (accessed: August 9, 2017).

Statistics Canada. Table 477-0019 *Postsecondary enrolments, by registration status, Pan-Canadian Standard Classification of Education (PCSCE), Classification of Instructional Programs, Primary Grouping (CIP_PG), sex and student status, annual* (table), CANSIM (database). Last updated November 23, 2016. http://www5.statcan.gc.ca/cansim/a05?lang=eng&id=4770019 (accessed: August 9, 2017).

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research, 45*(1), 89–125.

Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition* (2nd ed.). Chicago, IL: University of Chicago Press.

van Barneveld, A., Arnold, K. E., & Campbell, J. P. (2012). Analytics in higher education: Establishing a common language (Educause Learning Initiative Paper No. 1) *EDUCAUSE*. Retrieved from https://library.educause.edu/resources/2012/1/analytics-in-higher-education-establishing-a-common-language

Varney, J. (2013). Proactive advising. In J. K. Drake, P. Jordan, & M. A. Miller (Eds.), *Academic advising approaches: Strategies that teach students to make the most of college*. San Francisco, CA: Jossey-Bass.

Wiggers, R., & Arnold, C. (2011). *Defining, measuring and achieving "student success" in Ontario colleges and universities* (@ Issue Paper No. 10). Toronto, ON: Higher Education Quality Council of Ontario. Retrieved from http://www.heqco.ca/SiteCollectionDocuments/AtIssueStudent%20Success%20ENG.pdf

Woolston, D., & Ryan, R. (2007). Group advising. In P. Folsom, F. Yoder, & J. E. Joslin (Eds.), *The new advisor guidebook: Mastering the art of academic advising* (pp. 273–280). San Francisco, CA: Jossey-Bass.

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