

Short-Term Events, Long-Term Friends?

Freshman Orientation Peers and Academic Performance

Raphael Brade^a

EEA-ESEM Rotterdam

August 28, 2024

brade@if0.de

^a *ifo Institute, LMU Munich, and CESifo*

Motivation

Few days are as formative for our social lives as the first days of college:

- ▶ We meet new people, some of whom become our study partners, friends, or even spouses (Back et al., 2008; Nielsen and Svarer, 2009; Thiemann, 2022).

Motivation

Few days are as formative for our social lives as the first days of college:

- ▶ We meet new people, some of whom become our study partners, friends, or even spouses (Back et al., 2008; Nielsen and Svarer, 2009; Thiemann, 2022).
- ▶ But how do these connections affect our academic performance and progress?

Motivation

Few days are as formative for our social lives as the first days of college:

- ▶ We meet new people, some of whom become our study partners, friends, or even spouses (Back et al., 2008; Nielsen and Svarer, 2009; Thiemann, 2022).
- ▶ But how do these connections affect our academic performance and progress?

Motivation

Few days are as formative for our social lives as the first days of college:

- ▶ We meet new people, some of whom become our study partners, friends, or even spouses (Back et al., 2008; Nielsen and Svarer, 2009; Thiemann, 2022).
- ▶ But how do these connections affect our academic performance and progress?

The literature on peer effects provides only limited answers:

- ▶ Being surrounded by higher ability peers in dorms, classes, or cohorts has a positive effects on students' achievement (Booij et al., 2017; Carrell et al., 2009; Corno et al., 2022; Feld and Zölitz, 2017).

Motivation

Few days are as formative for our social lives as the first days of college:

- ▶ We meet new people, some of whom become our study partners, friends, or even spouses (Back et al., 2008; Nielsen and Svarer, 2009; Thiemann, 2022).
- ▶ But how do these connections affect our academic performance and progress?

The literature on peer effects provides only limited answers:

- ▶ Being surrounded by higher ability peers in dorms, classes, or cohorts has a positive effects on students' achievement (Booij et al., 2017; Carrell et al., 2009; Corno et al., 2022; Feld and Zölitz, 2017).
- ▶ But, these effects likely also arise because of other factors, such as the classroom environment and instructors' response to it (Coveney and Oosterveen, 2021).

Motivation

Few days are as formative for our social lives as the first days of college:

- ▶ We meet new people, some of whom become our study partners, friends, or even spouses (Back et al., 2008; Nielsen and Svarer, 2009; Thiemann, 2022).
- ▶ But how do these connections affect our academic performance and progress?

The literature on peer effects provides only limited answers:

- ▶ Being surrounded by higher ability peers in dorms, classes, or cohorts has a positive effects on students' achievement (Booij et al., 2017; Carrell et al., 2009; Corno et al., 2022; Feld and Zölitz, 2017).
- ▶ But, these effects likely also arise because of other factors, such as the classroom environment and instructors' response to it (Coveney and Oosterveen, 2021).
- ▶ Here, I study a setting that minimizes the influence of these other factors, due to its short duration and non-instructional nature.

Motivation

Few days are as formative for our social lives as the first days of college:

- ▶ We meet new people, some of whom become our study partners, friends, or even spouses (Back et al., 2008; Nielsen and Svarer, 2009; Thiemann, 2022).
- ▶ But how do these connections affect our academic performance and progress?

The literature on peer effects provides only limited answers:

- ▶ Being surrounded by higher ability peers in dorms, classes, or cohorts has a positive effects on students' achievement (Booij et al., 2017; Carrell et al., 2009; Corno et al., 2022; Feld and Zölitz, 2017).
- ▶ But, these effects likely also arise because of other factors, such as the classroom environment and instructors' response to it (Coveney and Oosterveen, 2021).
- ▶ Here, I study a setting that minimizes the influence of these other factors, due to its short duration and non-instructional nature.

Motivation

Few days are as formative for our social lives as the first days of college:

- ▶ We meet new people, some of whom become our study partners, friends, or even spouses (Back et al., 2008; Nielsen and Svarer, 2009; Thiemann, 2022).
- ▶ But how do these connections affect our academic performance and progress?

The literature on peer effects provides only limited answers:

- ▶ Being surrounded by higher ability peers in dorms, classes, or cohorts has a positive effects on students' achievement (Booij et al., 2017; Carrell et al., 2009; Corno et al., 2022; Feld and Zölitz, 2017).
- ▶ But, these effects likely also arise because of other factors, such as the classroom environment and instructors' response to it (Coveney and Oosterveen, 2021).
- ▶ Here, I study a setting that minimizes the influence of these other factors, due to its short duration and non-instructional nature.

Research question: does the ability composition of short-term freshman orientation groups matter for university students' long-term achievement?

Institutional background

Setting

Bachelor programs of the Department of Business Administration at a large German university of applied sciences (UAS):

- ▶ UAS have a more applied curriculum compared to traditional universities (e.g., include a mandatory internship), but are otherwise very comparable.

Setting

Bachelor programs of the Department of Business Administration at a large German university of applied sciences (UAS):

- ▶ UAS have a more applied curriculum compared to traditional universities (e.g., include a mandatory internship), but are otherwise very comparable.
- ▶ Currently enroll around 42,6% of German freshman students (Destatis, 2022).

Setting

Bachelor programs of the Department of Business Administration at a large German university of applied sciences (UAS):

- ▶ UAS have a more applied curriculum compared to traditional universities (e.g., include a mandatory internship), but are otherwise very comparable.
- ▶ Currently enroll around 42,6% of German freshman students (Destatis, 2022).
- ▶ Three programs: Business Administration (BuA), International Business (IB), and International Business and Technology (IBT).

Setting

Bachelor programs of the Department of Business Administration at a large German university of applied sciences (UAS):

- ▶ UAS have a more applied curriculum compared to traditional universities (e.g., include a mandatory internship), but are otherwise very comparable.
- ▶ Currently enroll around 42,6% of German freshman students (Destatis, 2022).
- ▶ Three programs: Business Administration (BuA), International Business (IB), and International Business and Technology (IBT).
- ▶ 350 to 400 students per cohort in BuA and about 75 per cohort in IB & IBT.

Setting

Bachelor programs of the Department of Business Administration at a large German university of applied sciences (UAS):

- ▶ UAS have a more applied curriculum compared to traditional universities (e.g., include a mandatory internship), but are otherwise very comparable.
- ▶ Currently enroll around 42,6% of German freshman students (Destatis, 2022).
- ▶ Three programs: Business Administration (BuA), International Business (IB), and International Business and Technology (IBT).
- ▶ 350 to 400 students per cohort in BuA and about 75 per cohort in IB & IBT.
- ▶ IB & IBT more selective and the language of instructions is English.

Freshman orientation

To help students get started, the department offers a two-day freshman orientation event that is organized in the same way for all three programs: [▶ Germany and US](#)

- ▶ Groups of ≈ 26 students who are supervised by randomly assigned tutors from more advanced semesters.

Freshman orientation

To help students get started, the department offers a two-day freshman orientation event that is organized in the same way for all three programs: [▶ Germany and US](#)

- ▶ Groups of ≈ 26 students who are supervised by randomly assigned tutors from more advanced semesters.
- ▶ Standardized content and activities: meet and greet with department staff, opportunities to socialize with fellow students, meetings with the student association, information about studying at a university and the weekly study schedule, and a campus rally.

Freshman orientation

To help students get started, the department offers a two-day freshman orientation event that is organized in the same way for all three programs: ▶ Germany and US

- ▶ Groups of ≈ 26 students who are supervised by randomly assigned tutors from more advanced semesters.
- ▶ Standardized content and activities: meet and greet with department staff, opportunities to socialize with fellow students, meetings with the student association, information about studying at a university and the weekly study schedule, and a campus rally.
- ▶ Attendance not mandatory, but 80 to 90% of students participate.

Freshman orientation

To help students get started, the department offers a two-day freshman orientation event that is organized in the same way for all three programs: ▶ Germany and US

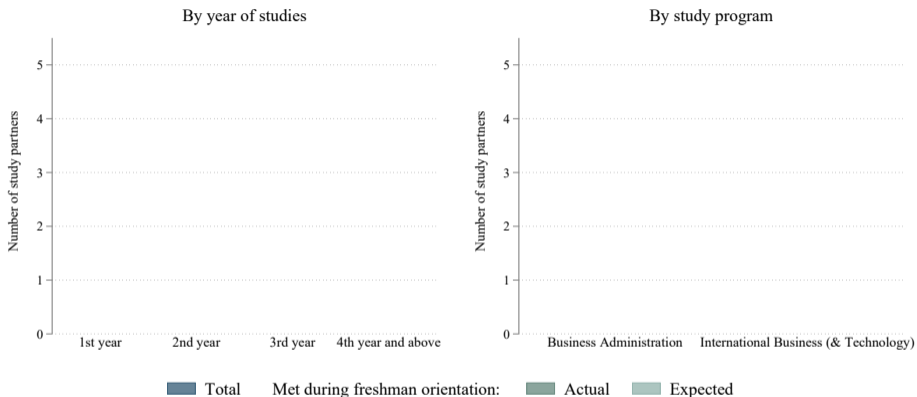
- ▶ Groups of ≈ 26 students who are supervised by randomly assigned tutors from more advanced semesters.
- ▶ Standardized content and activities: meet and greet with department staff, opportunities to socialize with fellow students, meetings with the student association, information about studying at a university and the weekly study schedule, and a campus rally.
- ▶ Attendance not mandatory, but 80 to 90% of students participate.
- ▶ Students assigned to groups based on the first letter of their last name (alphabetical order).

Freshman orientation

To help students get started, the department offers a two-day freshman orientation event that is organized in the same way for all three programs: ▶ Germany and US

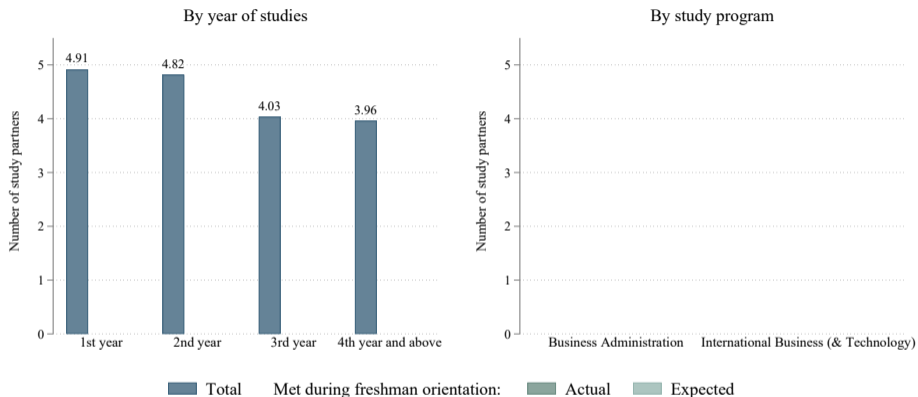
- ▶ Groups of ≈ 26 students who are supervised by randomly assigned tutors from more advanced semesters.
- ▶ Standardized content and activities: meet and greet with department staff, opportunities to socialize with fellow students, meetings with the student association, information about studying at a university and the weekly study schedule, and a campus rally.
- ▶ Attendance not mandatory, but 80 to 90% of students participate.
- ▶ Students assigned to groups based on the first letter of their last name (alphabetical order).
- ▶ Students are not allowed to change groups, and the groupings are not used for any other study-related activities, such as lectures and tutorials.

Students meet over a third of their study partners in freshman orientation



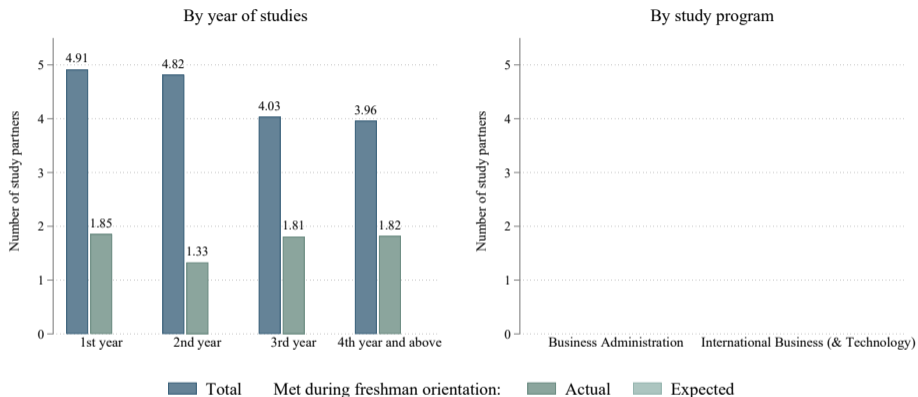
Notes: Total: With how many students from your current study program are you in contact so closely that you regularly exchange or discuss course materials or plan on studying for exams together?; Actual: "How many of these contacts have you met during an introductory week or during orientation days at the beginning of your studies?"; N = 380.

Students meet over a third of their study partners in freshman orientation



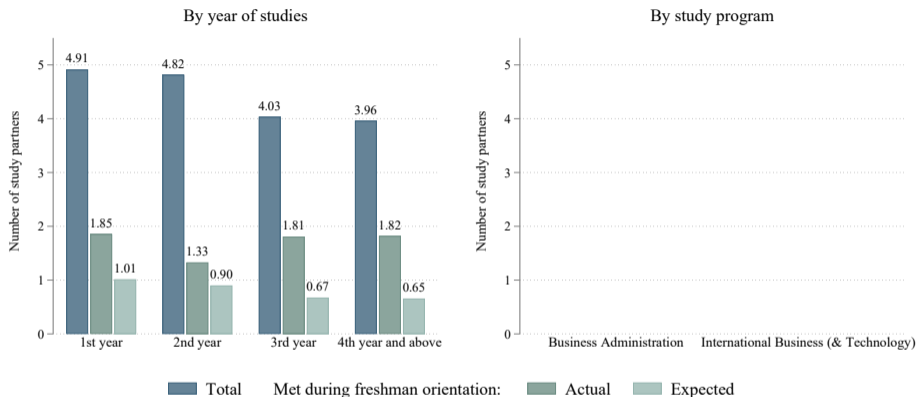
Notes: Total: With how many students from your current study program are you in contact so closely that you regularly exchange or discuss course materials or plan on studying for exams together?; Actual: "How many of these contacts have you met during an introductory week or during orientation days at the beginning of your studies?"; N = 380.

Students meet over a third of their study partners in freshman orientation



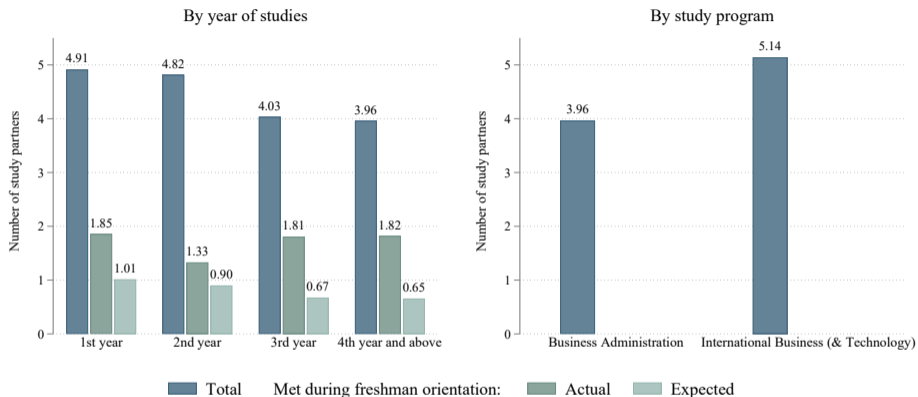
Notes: Total: With how many students from your current study program are you in contact so closely that you regularly exchange or discuss course materials or plan on studying for exams together?; Actual: "How many of these contacts have you met during an introductory week or during orientation days at the beginning of your studies?"; N = 380.

Students meet over a third of their study partners in freshman orientation



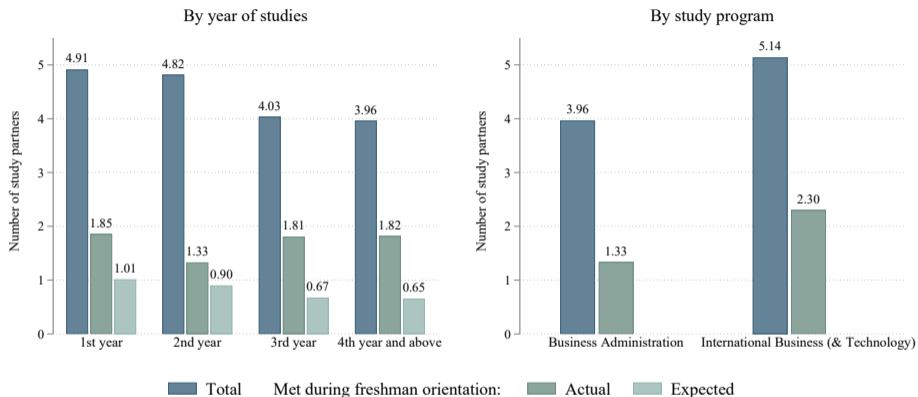
Notes: Total: With how many students from your current study program are you in contact so closely that you regularly exchange or discuss course materials or plan on studying for exams together?; Actual: "How many of these contacts have you met during an introductory week or during orientation days at the beginning of your studies?"; N = 380.

Students meet over a third of their study partners in freshman orientation



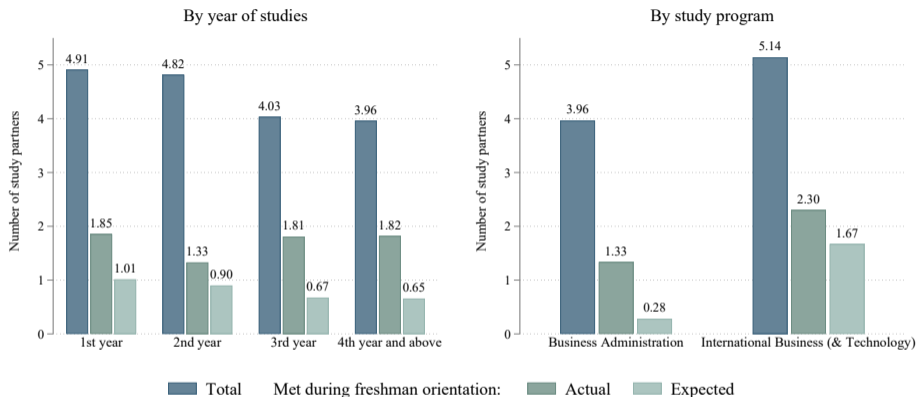
Notes: Total: With how many students from your current study program are you in contact so closely that you regularly exchange or discuss course materials or plan on studying for exams together?; Actual: "How many of these contacts have you met during an introductory week or during orientation days at the beginning of your studies?"; N = 380.

Students meet over a third of their study partners in freshman orientation



Notes: Total: With how many students from your current study program are you in contact so closely that you regularly exchange or discuss course materials or plan on studying for exams together?; Actual: "How many of these contacts have you met during an introductory week or during orientation days at the beginning of your studies?"; N = 380.

Students meet over a third of their study partners in freshman orientation



Notes: Total: With how many students from your current study program are you in contact so closely that you regularly exchange or discuss course materials or plan on studying for exams together?; Actual: "How many of these contacts have you met during an introductory week or during orientation days at the beginning of your studies?"; N = 380.

After orientation, the environment in BuA is generally less socially interactive.

▶ Table

Data and empirical approach

Data sources

1. Organizers of the freshman orientation program:
 - ▶ Group assignments: winter semesters 2016 to 2019 (BuA) and 2017 to 2019 (IB & IBT)).

Data sources

1. Organizers of the freshman orientation program:
 - ▶ Group assignments: winter semesters 2016 to 2019 (BuA) and 2017 to 2019 (IB & IBT)).
 - ▶ For $\approx 99\%$ of the students this information could be matched to administrative data.

Data sources

1. Organizers of the freshman orientation program:
 - ▶ Group assignments: winter semesters 2016 to 2019 (BuA) and 2017 to 2019 (IB & IBT)).
 - ▶ For $\approx 99\%$ of the students this information could be matched to administrative data.

Data sources

1. Organizers of the freshman orientation program:

- ▶ Group assignments: winter semesters 2016 to 2019 (BuA) and 2017 to 2019 (IB & IBT)).
- ▶ For $\approx 99\%$ of the students this information could be matched to administrative data.

2. Administrative data:

- ▶ Information on students' background characteristics (e.g., HS GPA, age, gender, citizenship, and type of high school degree). [▶ Table](#)

Data sources

1. Organizers of the freshman orientation program:

- ▶ Group assignments: winter semesters 2016 to 2019 (BuA) and 2017 to 2019 (IB & IBT)).
- ▶ For $\approx 99\%$ of the students this information could be matched to administrative data.

2. Administrative data:

- ▶ Information on students' background characteristics (e.g., HS GPA, age, gender, citizenship, and type of high school degree). [▶ Table](#)
- ▶ Information on students' academic achievements until the end of the sixth semester (course credits, persistence, and GPA). [▶ Table](#)

Data sources

1. Organizers of the freshman orientation program:

- ▶ Group assignments: winter semesters 2016 to 2019 (BuA) and 2017 to 2019 (IB & IBT)).
- ▶ For $\approx 99\%$ of the students this information could be matched to administrative data.

2. Administrative data:

- ▶ Information on students' background characteristics (e.g., HS GPA, age, gender, citizenship, and type of high school degree). [▶ Table](#)
- ▶ Information on students' academic achievements until the end of the sixth semester (course credits, persistence, and GPA). [▶ Table](#)
- ▶ Main outcome is the standardized inverse-covariance weighted average of the three performance dimensions (Anderson, 2008).

Data sources

1. Organizers of the freshman orientation program:

- ▶ Group assignments: winter semesters 2016 to 2019 (BuA) and 2017 to 2019 (IB & IBT)).
- ▶ For $\approx 99\%$ of the students this information could be matched to administrative data.

2. Administrative data:

- ▶ Information on students' background characteristics (e.g., HS GPA, age, gender, citizenship, and type of high school degree). [▶ Table](#)
- ▶ Information on students' academic achievements until the end of the sixth semester (course credits, persistence, and GPA). [▶ Table](#)
- ▶ Main outcome is the standardized inverse-covariance weighted average of the three performance dimensions (Anderson, 2008).

Data sources

1. Organizers of the freshman orientation program:

- ▶ Group assignments: winter semesters 2016 to 2019 (BuA) and 2017 to 2019 (IB & IBT)).
- ▶ For $\approx 99\%$ of the students this information could be matched to administrative data.

2. Administrative data:

- ▶ Information on students' background characteristics (e.g., HS GPA, age, gender, citizenship, and type of high school degree). [▶ Table](#)
- ▶ Information on students' academic achievements until the end of the sixth semester (course credits, persistence, and GPA). [▶ Table](#)
- ▶ Main outcome is the standardized inverse-covariance weighted average of the three performance dimensions (Anderson, 2008).

3. Out-of-sample online surveys: information on study partners and social interaction.

Linear-in-means model of peer effects

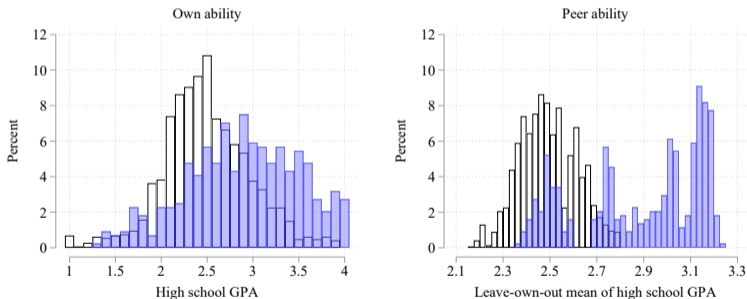
$$Y_{igc}^k = \alpha_0 + \alpha_1 x_i + \alpha_2 \bar{x}_{-ig} + \mathbf{z}_i \boldsymbol{\alpha}_3 + \mathbf{s}_g \boldsymbol{\alpha}_4 + \mathbf{w}_c \boldsymbol{\alpha}_5 + \varepsilon_{igc}, \quad (1)$$

x_i : std(HS GPA); \bar{x}_{-ig} : std(peer HS GPA); \mathbf{z}_i : ind. controls; \mathbf{s}_g : group controls; \mathbf{w}_c : selection pool FE

Linear-in-means model of peer effects

$$Y_{igc}^k = \alpha_0 + \alpha_1 x_i + \alpha_2 \bar{x}_{-ig} + \mathbf{z}_i \boldsymbol{\alpha}_3 + \mathbf{s}_g \boldsymbol{\alpha}_4 + \mathbf{w}_c \boldsymbol{\alpha}_5 + \varepsilon_{igc}, \quad (1)$$

x_i : std(HS GPA); \bar{x}_{-ig} : std(peer HS GPA); \mathbf{z}_i : ind. controls; \mathbf{s}_g : group controls; \mathbf{w}_c : selection pool FE



□ Business Administration ■ International Business (& Technology)

► HS GPA and Achievement

Threats to identification

1. Reflection problem, i.e., individuals in a group simultaneously influence each other.

Threats to identification

1. Reflection problem, i.e., individuals in a group simultaneously influence each other.
2. Unobserved common shocks, e.g., on cohort or group level.

Threats to identification

1. Reflection problem, i.e., individuals in a group simultaneously influence each other.
2. Unobserved common shocks, e.g., on cohort or group level.
3. Endogenous selection into peer groups.

Threats to identification

1. Reflection problem, i.e., individuals in a group simultaneously influence each other.
2. Unobserved common shocks, e.g., on cohort or group level.
3. Endogenous selection into peer groups.

Threats to identification

1. Reflection problem, i.e., individuals in a group simultaneously influence each other.
2. Unobserved common shocks, e.g., on cohort or group level.
3. Endogenous selection into peer groups.

Assignment mechanism leads to group compositions that are as good as random:

- ▶ Peer ability and background are uncorrelated with students own ability and background:

▶ Permutation test

▶ Guryan et al. 2009

Threats to identification

1. Reflection problem, i.e., individuals in a group simultaneously influence each other.
2. Unobserved common shocks, e.g., on cohort or group level.
3. Endogenous selection into peer groups.

Assignment mechanism leads to group compositions that are as good as random:

- ▶ Peer ability and background are uncorrelated with students own ability and background:

▶ Permutation test

▶ Guryan et al. 2009

Threats to identification

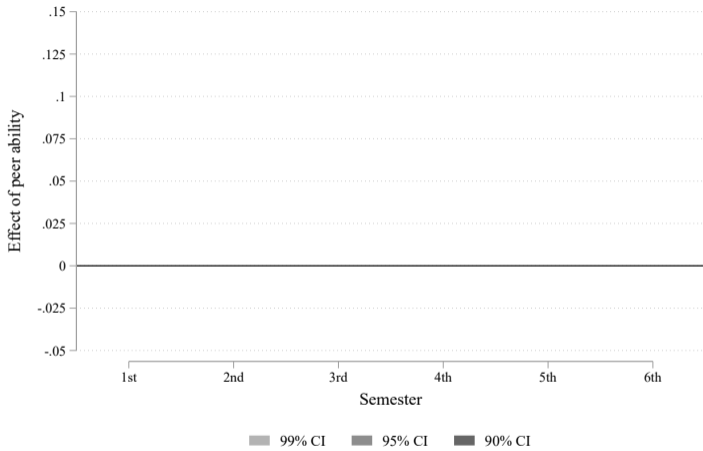
1. Reflection problem, i.e., individuals in a group simultaneously influence each other.
2. Unobserved common shocks, e.g., on cohort or group level.
3. Endogenous selection into peer groups.

Assignment mechanism leads to group compositions that are as good as random:

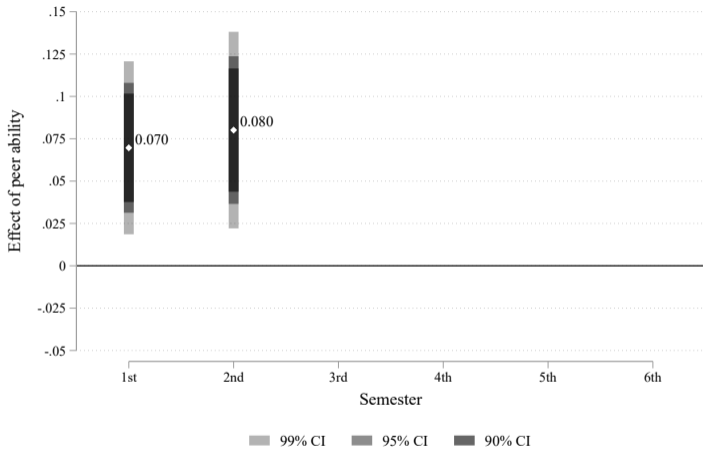
- ▶ Peer ability and background are uncorrelated with students own ability and background:
 - ▶ Permutation test
 - ▶ Guryan et al. 2009
- ▶ Orientation group dummies are not predictive of students' ability and background characteristics:
 - ▶ P-values

Peer effects in Business Administration

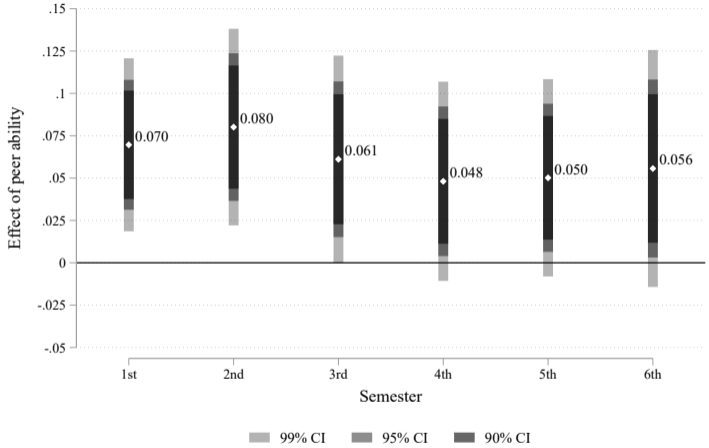
Assignment to higher ability peers improves academic performance



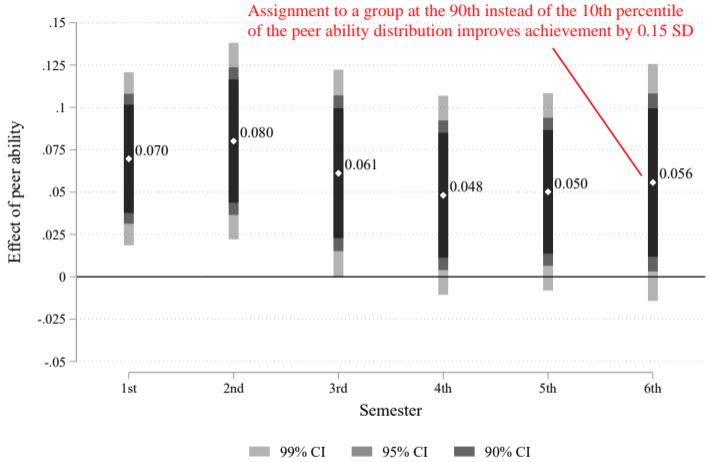
Assignment to higher ability peers improves academic performance



Assignment to higher ability peers improves academic performance



Assignment to higher ability peers improves academic performance



▶ Table

▶ Further results

▶ Robustness

Social connections

Are effects driven by connections formed in orientation?

1. Heterogeneity by students' "isolation probability":

- ▶ Using out-of-sample survey data, I predict students' probability to have no study partners from freshman orientation. [▶ Prediction models](#)

Are effects driven by connections formed in orientation?

1. Heterogeneity by students' "isolation probability":

- ▶ Using out-of-sample survey data, I predict students' probability to have no study partners from freshman orientation. ▶ Prediction models
- ▶ Then split the sample at the median of the isolation probabilities. ▶ Descriptives

Are effects driven by connections formed in orientation?

1. Heterogeneity by students' "isolation probability":

- ▶ Using out-of-sample survey data, I predict students' probability to have no study partners from freshman orientation. ▶ Prediction models
- ▶ Then split the sample at the median of the isolation probabilities. ▶ Descriptives
- ▶ Effects are driven by students with a low isolation probability. ▶ Figure

Are effects driven by connections formed in orientation?

1. Heterogeneity by students' "isolation probability":

- ▶ Using out-of-sample survey data, I predict students' probability to have no study partners from freshman orientation. ▶ Prediction models
- ▶ Then split the sample at the median of the isolation probabilities. ▶ Descriptives
- ▶ Effects are driven by students with a low isolation probability. ▶ Figure

Are effects driven by connections formed in orientation?

1. Heterogeneity by students' "isolation probability":

- ▶ Using out-of-sample survey data, I predict students' probability to have no study partners from freshman orientation. [▶ Prediction models](#)
- ▶ Then split the sample at the median of the isolation probabilities. [▶ Descriptives](#)
- ▶ Effects are driven by students with a low isolation probability. [▶ Figure](#)

2. Students' specialization choices:

- ▶ From fourth semester onward, students choose three out of sixteen possible specializations such as finance, controlling, human resource management, or business taxation.

Are effects driven by connections formed in orientation?

1. Heterogeneity by students' "isolation probability":

- ▶ Using out-of-sample survey data, I predict students' probability to have no study partners from freshman orientation. [▶ Prediction models](#)
- ▶ Then split the sample at the median of the isolation probabilities. [▶ Descriptives](#)
- ▶ Effects are driven by students with a low isolation probability. [▶ Figure](#)

2. Students' specialization choices:

- ▶ From fourth semester onward, students choose three out of sixteen possible specializations such as finance, controlling, human resource management, or business taxation.
- ▶ Fraction of orientation peers choosing a specialization is positively correlated with students own choice. [▶ Table](#)

Generalizability

Do peer effects depend on the broader study environment?

Heterogeneity by study programs:

- ▶ Freshman orientation in my context is organized in the same way for very different study programs: BuA and IB(&T).


Do peer effects depend on the broader study environment?

Heterogeneity by study programs:

- ▶ Freshman orientation in my context is organized in the same way for very different study programs: BuA and IB(&T).
- ▶ IB(&T) more selective in who they admit, cohorts are smaller, and there is more social interaction between students.

Do peer effects depend on the broader study environment?

Heterogeneity by study programs:

- ▶ Freshman orientation in my context is organized in the same way for very different study programs: BuA and IB(&T).
- ▶ IB(&T) more selective in who they admit, cohorts are smaller, and there is more social interaction between students.
- ▶ Significantly smaller, and non-significant negative effect on achievement in IB(&T).  Figure

Do peer effects depend on the broader study environment?

Heterogeneity by study programs:

- ▶ Freshman orientation in my context is organized in the same way for very different study programs: BuA and IB(&T).
- ▶ IB(&T) more selective in who they admit, cohorts are smaller, and there is more social interaction between students.
- ▶ Significantly smaller, and non-significant negative effect on achievement in IB(&T). [▶ Figure](#)
- ▶ Relatedly, study choices of students and their peers are not correlated in IB(&T). [▶ Choices](#)

Do peer effects depend on the broader study environment?

Heterogeneity by study programs:

- ▶ Freshman orientation in my context is organized in the same way for very different study programs: BuA and IB(&T).
- ▶ IB(&T) more selective in who they admit, cohorts are smaller, and there is more social interaction between students.
- ▶ Significantly smaller, and non-significant negative effect on achievement in IB(&T). [▶ Figure](#)
- ▶ Relatedly, study choices of students and their peers are not correlated in IB(&T). [▶ Choices](#)

Do peer effects depend on the broader study environment?

Heterogeneity by study programs:

- ▶ Freshman orientation in my context is organized in the same way for very different study programs: BuA and IB(&T).
- ▶ IB(&T) more selective in who they admit, cohorts are smaller, and there is more social interaction between students.
- ▶ Significantly smaller, and non-significant negative effect on achievement in IB(&T). [▶ Figure](#)
- ▶ Relatedly, study choices of students and their peers are not correlated in IB(&T). [▶ Choices](#)

Some evidence that heterogeneity is unlikely to be explained by selectivity of programs:

- ▶ Study program heterogeneity robust to interacting peer ability with other controls. [▶ Table](#)

Do peer effects depend on the broader study environment?

Heterogeneity by study programs:

- ▶ Freshman orientation in my context is organized in the same way for very different study programs: BuA and IB(&T).
- ▶ IB(&T) more selective in who they admit, cohorts are smaller, and there is more social interaction between students.
- ▶ Significantly smaller, and non-significant negative effect on achievement in IB(&T). [▶ Figure](#)
- ▶ Relatedly, study choices of students and their peers are not correlated in IB(&T). [▶ Choices](#)

Some evidence that heterogeneity is unlikely to be explained by selectivity of programs:

- ▶ Study program heterogeneity robust to interacting peer ability with other controls. [▶ Table](#)
- ▶ If anything, students in BuA who are more similar to IB/IBT students in terms of their observable characteristics benefit more from higher ability peers. [▶ Characteristics](#) [▶ Results](#)

Do peer effects depend on the broader study environment?

Heterogeneity by study programs:

- ▶ Freshman orientation in my context is organized in the same way for very different study programs: BuA and IB(&T).
- ▶ IB(&T) more selective in who they admit, cohorts are smaller, and there is more social interaction between students.
- ▶ Significantly smaller, and non-significant negative effect on achievement in IB(&T). [▶ Figure](#)
- ▶ Relatedly, study choices of students and their peers are not correlated in IB(&T). [▶ Choices](#)

Some evidence that heterogeneity is unlikely to be explained by selectivity of programs:

- ▶ Study program heterogeneity robust to interacting peer ability with other controls. [▶ Table](#)
- ▶ If anything, students in BuA who are more similar to IB/IBT students in terms of their observable characteristics benefit more from higher ability peers. [▶ Characteristics](#) [▶ Results](#)

Do peer effects depend on the broader study environment?

Heterogeneity by study programs:

- ▶ Freshman orientation in my context is organized in the same way for very different study programs: BuA and IB(&T).
- ▶ IB(&T) more selective in who they admit, cohorts are smaller, and there is more social interaction between students.
- ▶ Significantly smaller, and non-significant negative effect on achievement in IB(&T). [▶ Figure](#)
- ▶ Relatedly, study choices of students and their peers are not correlated in IB(&T). [▶ Choices](#)

Some evidence that heterogeneity is unlikely to be explained by selectivity of programs:

- ▶ Study program heterogeneity robust to interacting peer ability with other controls. [▶ Table](#)
- ▶ If anything, students in BuA who are more similar to IB/IBT students in terms of their observable characteristics benefit more from higher ability peers. [▶ Characteristics](#) [▶ Results](#)

↔ Suggests that positive effects of being assigned to higher ability freshman peers may only emerge in large and overall less socially interactive study environments.

Conclusions

Conclusions

1. Brief social interactions can be sufficient for lasting performance spillovers. Important for settings in which it is infeasible to create longer-term peer contexts.

Conclusions

1. Brief social interactions can be sufficient for lasting performance spillovers. Important for settings in which it is infeasible to create longer-term peer contexts.
2. Formation of social ties is an important channel underlying peer effects.

Conclusions

1. Brief social interactions can be sufficient for lasting performance spillovers. Important for settings in which it is infeasible to create longer-term peer contexts.
2. Formation of social ties is an important channel underlying peer effects.
3. But results also suggest that effects of brief social interactions depend on the broader organizational environment.

Conclusions

1. Brief social interactions can be sufficient for lasting performance spillovers. Important for settings in which it is infeasible to create longer-term peer contexts.
2. Formation of social ties is an important channel underlying peer effects.
3. But results also suggest that effects of brief social interactions depend on the broader organizational environment.
4. Designers of orientation programs need to take into account that effects may be considerably smaller in settings that are already highly interactive.

Conclusions

1. Brief social interactions can be sufficient for lasting performance spillovers. Important for settings in which it is infeasible to create longer-term peer contexts.
2. Formation of social ties is an important channel underlying peer effects.
3. But results also suggest that effects of brief social interactions depend on the broader organizational environment.
4. Designers of orientation programs need to take into account that effects may be considerably smaller in settings that are already highly interactive.
5. No clear implication for group assignments: due to the linearity of the effects, no individual can be made better off by reallocation without making another individual worse off.

Conclusions

1. Brief social interactions can be sufficient for lasting performance spillovers. Important for settings in which it is infeasible to create longer-term peer contexts.
2. Formation of social ties is an important channel underlying peer effects.
3. But results also suggest that effects of brief social interactions depend on the broader organizational environment.
4. Designers of orientation programs need to take into account that effects may be considerably smaller in settings that are already highly interactive.
5. No clear implication for group assignments: due to the linearity of the effects, no individual can be made better off by reallocation without making another individual worse off.
6. Inequality-averse policymakers may prefer ability mixing to reduce variance in academic achievements.

Contribution

1. Brief social interactions can be sufficient for substantial and persistent peer effects:
 - ▶ Existing research in (higher) education mainly finds positive effects, but focuses on longer-lasting cohort, tutorial group, or dormitory compositions. (Booij et al., 2017; Carrell et al., 2009; Feld and Zölitz, 2017; Humlum and Thorsager, 2021).

Contribution

1. Brief social interactions can be sufficient for substantial and persistent peer effects:
 - ▶ Existing research in (higher) education mainly finds positive effects, but focuses on longer-lasting cohort, tutorial group, or dormitory compositions. (Booij et al., 2017; Carrell et al., 2009; Feld and Zölitz, 2017; Humlum and Thorsager, 2021).
 - ▶ Evidence on workplace peer effects also largely based on the contemporaneous effort or productivity of peers (Bandiera et al., 2010; Mas and Moretti, 2009; Tan and Netessine, 2019).

Contribution

1. Brief social interactions can be sufficient for substantial and persistent peer effects:
 - ▶ Existing research in (higher) education mainly finds positive effects, but focuses on longer-lasting cohort, tutorial group, or dormitory compositions. (Booij et al., 2017; Carrell et al., 2009; Feld and Zölitz, 2017; Humlum and Thorsager, 2021).
 - ▶ Evidence on workplace peer effects also largely based on the contemporaneous effort or productivity of peers (Bandiera et al., 2010; Mas and Moretti, 2009; Tan and Netessine, 2019).
 - ▶ Two existing studies on ability peer effects in freshman orientation find no or negative effects of higher-ability freshman peers (Fischer and Rode, 2020; Thiemann, 2022).

Contribution

2. Mechanisms of peer effects in education (Conley et al., 2024; Coveney and Oosterveen, 2021):
 - ▶ Brief nature of orientation virtually rules out mechanisms related to the classroom environment and instructor behavior (Duflo et al., 2011; Lavy and Schlosser, 2011; Lavy et al., 2012).

Contribution

2. Mechanisms of peer effects in education (Conley et al., 2024; Coveney and Oosterveen, 2021):
 - ▶ Brief nature of orientation virtually rules out mechanisms related to the classroom environment and instructor behavior (Duflo et al., 2011; Lavy and Schlosser, 2011; Lavy et al., 2012).
 - ▶ Instead, my findings provide evidence for the important role of forming lasting social connections (Booij et al., 2017; Carrell et al., 2013; Feld and Zölitz, 2017; Garlick, 2018).

Contribution

2. Mechanisms of peer effects in education (Conley et al., 2024; Coveney and Oosterveen, 2021):
 - ▶ Brief nature of orientation virtually rules out mechanisms related to the classroom environment and instructor behavior (Duflo et al., 2011; Lavy and Schlosser, 2011; Lavy et al., 2012).
 - ▶ Instead, my findings provide evidence for the important role of forming lasting social connections (Booij et al., 2017; Carrell et al., 2013; Feld and Zölitz, 2017; Garlick, 2018).

Contribution

2. Mechanisms of peer effects in education (Conley et al., 2024; Coveney and Oosterveen, 2021):
 - ▶ Brief nature of orientation virtually rules out mechanisms related to the classroom environment and instructor behavior (Duflo et al., 2011; Lavy and Schlosser, 2011; Lavy et al., 2012).
 - ▶ Instead, my findings provide evidence for the important role of forming lasting social connections (Booij et al., 2017; Carrell et al., 2013; Feld and Zölitz, 2017; Garlick, 2018).
3. Context dependence of peer effects (Sacerdote, 2014; Villeval, 2020):
 - ▶ Results suggests that other social dynamics and knowledge flows moderate performance spillovers from brief social interactions (Cai and Szeidl, 2018; Frakes and Wasserman, 2021; Sandvik et al., 2020).

Contribution

2. Mechanisms of peer effects in education (Conley et al., 2024; Coveney and Oosterveen, 2021):
 - ▶ Brief nature of orientation virtually rules out mechanisms related to the classroom environment and instructor behavior (Duflo et al., 2011; Lavy and Schlosser, 2011; Lavy et al., 2012).
 - ▶ Instead, my findings provide evidence for the important role of forming lasting social connections (Booij et al., 2017; Carrell et al., 2013; Feld and Zölitz, 2017; Garlick, 2018).
3. Context dependence of peer effects (Sacerdote, 2014; Villeval, 2020):
 - ▶ Results suggests that other social dynamics and knowledge flows moderate performance spillovers from brief social interactions (Cai and Szeidl, 2018; Frakes and Wasserman, 2021; Sandvik et al., 2020).
 - ▶ Sheds light on the external validity of my findings (List, 2020).

Thank you!

brade@iffo.de

Link to Working Paper:



Robustness checks

Main results robust to different specifications and other ways to conduct inference:

1. Wild cluster bootstrap [▶ Table](#)
2. Non-clustered standard errors [▶ Table](#)
3. Permutation based inference [▶ Figure](#)
4. Exclusion of control variables [▶ Table](#)
5. Inclusion of first letter of last name FE [▶ Table](#)
6. Controlling for other peer characteristics [▶ Table](#)
7. Allowing for heterogeneity by cohort FE [▶ Table](#) and other controls [▶ Table](#)
8. MHT correction for index components [▶ Table](#)

[▶ Back](#)

Further results

1. Effects on individual achievement dimensions: One SD increase in peer ability increases...

- ▶ ...accumulated course credits by 3 in the 6th semester ($p = 0.026$). [▶ Figure](#)
- ▶ ...persistence by 2 pp in the 6th semester ($p = 0.062$). [▶ Figure](#)
- ▶ ... GPA by 0.064 SD in the 1st ($p = 0.009$), and 0.033 SD in the 6th semester ($p = 0.133$). [▶ Figure](#)

Further results

1. Effects on individual achievement dimensions: One SD increase in peer ability increases...
 - ▶ ...accumulated course credits by 3 in the 6th semester ($p = 0.026$). [▶ Figure](#)
 - ▶ ...persistence by 2 pp in the 6th semester ($p = 0.062$). [▶ Figure](#)
 - ▶ ... GPA by 0.064 SD in the 1st ($p = 0.009$), and 0.033 SD in the 6th semester ($p = 0.133$). [▶ Figure](#)
2. Linear-in-means model provides a good approximation of the relationship between peer ability and academic achievement. [▶ Binscatter](#) [▶ Fractions](#)

Further results

1. Effects on individual achievement dimensions: One SD increase in peer ability increases...
 - ▶ ...accumulated course credits by 3 in the 6th semester ($p = 0.026$). [▶ Figure](#)
 - ▶ ...persistence by 2 pp in the 6th semester ($p = 0.062$). [▶ Figure](#)
 - ▶ ... GPA by 0.064 SD in the 1st ($p = 0.009$), and 0.033 SD in the 6th semester ($p = 0.133$). [▶ Figure](#)
2. Linear-in-means model provides a good approximation of the relationship between peer ability and academic achievement. [▶ Binscatter](#) [▶ Fractions](#)
3. No heterogeneous effects by students' own ability. [▶ Linear](#) [▶ Terciles](#)

[▶ Back](#)

Freshman orientation in the US and Germany

Goal: Introduce students to college, familiarize them with resources and services, enable them to form social connections, and to become part of the community.

US: About 70% of colleges offer some form of new student orientation (Feygin et al., 2022).

Germany:

Type of event	(1) Offer	(2) Participation	(3) Rather/very helpful
Getting to know fellow students	92.48%	77.64%	90.18%
Central facilities	90.26%	65.51%	82.67%
Study organization	80.83%	65.45%	84.09%
Bridging courses	49.17%	24.41%	78.16%
Academic skills	44.74%	27.07%	79.14%
No event offered	0.33%		

Note: Own depiction based on data from the representative National Educational Panel Study starting cohort five.

▶ Back

Descriptive statistics I

	<i>Business Administration</i>					<i>International Business (& Technology)</i>				
	(1) N	(2) Mean	(3) SD	(4) Min.	(5) Max	(6) N	(7) Mean	(8) SD	(9) Min.	(10) Max
<i>a) Student background</i>										
Woman	1,459	0.54	0.50	0.00	1.00	440	0.50	0.50	0.00	1.00
Non-German citizen	1,459	0.09	0.28	0.00	1.00	440	0.22	0.41	0.00	1.00
Age	1,459	21.93	3.42	17.83	51.07	440	21.23	2.74	17.66	36.02
High school GPA	1,459	2.49	0.47	1.00	4.00	440	2.89	0.61	1.30	4.00
Time since HS degree	1,459	1.99	2.69	0.15	27.26	440	1.68	2.01	0.19	14.32
HS degree Abitur	1,459	0.44	0.50	0.00	1.00	440	0.70	0.46	0.00	1.00
HS degree local	1,459	0.31	0.46	0.00	1.00	440	0.24	0.43	0.00	1.00
HS degree other state	1,459	0.07	0.26	0.00	1.00	440	0.12	0.33	0.00	1.00
HS degree foreign	1,459	0.04	0.20	0.00	1.00	440	0.20	0.40	0.00	1.00
First university	1,459	0.72	0.45	0.00	1.00	440	0.77	0.42	0.00	1.00
Enrollment date	1,459	41.53	7.02	0.00	61.00	440	37.79	10.48	0.00	61.00
Enrollment date N/A	1,459	0.08	0.27	0.00	1.00	440	0.06	0.24	0.00	1.00
<i>b) Peer ability</i>										
Peer high school GPA	1,459	2.49	0.12	2.17	2.79	440	2.89	0.26	2.37	3.24
<i>c) Group characteristics</i>										
Original group size	55	26.85	2.14	17.00	32.00	18	25.22	2.34	22.00	28.00
Share not matched	55	0.01	0.02	0.00	0.07	18	0.03	0.06	0.00	0.21
Group size	55	26.53	2.19	17.00	32.00	18	24.44	2.25	22.00	28.00

▶ Back

Descriptive statistics II

	<i>Business Administration</i>					<i>International Business (& Technology)</i>				
	(1) N	(2) Mean	(3) SD	(4) Min.	(5) Max	(6) N	(7) Mean	(8) SD	(9) Min.	(10) Max
<i>d) Student outcomes</i>										
<i>First semester</i>										
Accumulated credits	1,459	25.44	12.67	0.00	98.00	440	22.53	15.63	0.00	155.00
Persistence	1,459	0.95	0.22	0.00	1.00	440	0.95	0.23	0.00	1.00
GPA	1,377	2.52	0.53	1.15	4.00	393	2.53	0.69	1.00	4.00
<i>Second semester</i>										
Accumulated credits	1,459	46.78	21.24	0.00	149.00	440	47.12	24.23	0.00	186.00
Persistence	1,459	0.85	0.36	0.00	1.00	440	0.86	0.35	0.00	1.00
GPA	1,384	2.49	0.52	1.10	4.00	403	2.59	0.59	1.00	4.00
<i>Third semester</i>										
Accumulated credits	1,459	67.78	31.54	0.00	192.00	440	67.53	33.78	0.00	188.50
Persistence	1,459	0.82	0.38	0.00	1.00	440	0.84	0.37	0.00	1.00
GPA	1,386	2.48	0.50	1.15	4.00	404	2.57	0.56	1.00	4.00
<i>Fourth semester</i>										
Accumulated credits	1,459	88.29	42.82	0.00	210.00	440	87.72	44.09	0.00	210.00
Persistence	1,459	0.79	0.41	0.00	1.00	440	0.78	0.41	0.00	1.00
GPA	1,386	2.53	0.49	1.15	4.00	405	2.55	0.55	1.00	4.00
<i>Fifth semester</i>										
Accumulated credits	1,459	108.33	54.50	0.00	210.00	440	102.08	52.53	0.00	212.00
Persistence	1,459	0.78	0.41	0.00	1.00	440	0.77	0.42	0.00	1.00
GPA	1,386	2.55	0.49	1.15	4.00	405	2.55	0.54	1.00	4.00
<i>Sixth semester</i>										
Accumulated credits	1,459	127.81	65.82	0.00	221.00	440	120.73	63.16	0.00	212.00
Persistence	1,459	0.76	0.43	0.00	1.00	440	0.75	0.43	0.00	1.00
GPA	1,386	2.59	0.49	1.15	4.00	405	2.58	0.53	1.00	4.00

▶ Back

Social environment after orientation is less interactive in BuA

Outcome	(1) Index	(2) Work together	(3) Discuss content	(4) Ask advice	(5) Joint goals	(6) Learning agreements	(7) Tell others about goals
IB(&T)	0.257** (0.124)	0.220* (0.127)	0.217* (0.126)	0.095 (0.123)	0.141 (0.123)	0.335*** (0.122)	0.097 (0.125)
Study year FE	yes	yes	yes	yes	yes	yes	yes
Covid cohort FE	yes	yes	yes	yes	yes	yes	yes
Survey FE	yes	yes	yes	yes	yes	yes	yes
R^2	0.03	0.03	0.03	0.01	0.02	0.06	0.02
N	321	319	319	320	316	315	316

Note: The table reports estimates from regressing different measures of social interaction on an IB/IBT dummy (reference group are BuA students). The underlying data is from online surveys that were conducted in the summer semesters of 2022 and 2023 among all bachelor students at the university. *Index* is the standardized inverse-covariance weighted average of the other outcomes. The outcomes in Columns (2) to (7) are standardized within survey waves and based on the following question and sub-items: "Now we would like to know more about learning with other students. For each activity, please indicate how often it is typically done by you.": *Work together*: "I work on texts or assignments together with my fellow students."; *Discuss content*: "I discuss the course content with fellow students."; *Ask advice*: "If something is not clear to me, I ask fellow students for advice"; *Joint goals*: "I set learning goals together with my fellow students."; *Learning agreements*: "I make learning agreements with my fellow students (e.g., distribution and preparation of learning content and group work)."; *Tell others about goals*: "I tell my fellow students, friends, or family about my learning goals."; Answer categories were 1 – Very rarely, 5 – Very often, and "no answer" in summer semester 2022, and 1 – Very rarely, 7 – Very often, and "no answer" in summer semester 2023. Robust standard errors clustered at the student level in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Regression of achievement on HS GPA and type of HS degree – Full Sample

Semester	<i>Ach. ind.</i>		<i>Acc. credits</i>		<i>Persistence</i>		<i>Std. GPA</i>	
	(1) Second	(2) Sixth	(3) Second	(4) Sixth	(5) Second	(6) Sixth	(7) Second	(8) Sixth
<i>a) Full sample</i>								
High School GPA	0.401*** (0.076)	0.533*** (0.072)	6.902*** (1.543)	17.801*** (4.522)	-0.011 (0.027)	0.072** (0.032)	0.960*** (0.070)	0.944*** (0.069)
HS degree Abitur	0.387 (0.243)	0.516** (0.233)	15.262*** (5.471)	32.711** (15.317)	0.002 (0.087)	0.169 (0.105)	0.566*** (0.216)	0.589*** (0.219)
Abitur*HS GPA	-0.097 (0.097)	-0.129 (0.092)	-4.564** (2.054)	-9.041 (5.883)	0.000 (0.034)	-0.054 (0.040)	-0.107 (0.084)	-0.112 (0.084)
Cohort FE	yes	yes	yes	yes	yes	yes	yes	yes
Study program FE	yes	yes	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes	yes	yes
R^2	0.09	0.14	0.11	0.12	0.02	0.05	0.25	0.27
N	1,899	1,899	1,899	1,899	1,899	1,899	1,787	1,791

► Back

Regression of achievement on HS GPA and type of HS degree – BuA

Semester	<i>Ach. ind.</i>		<i>Acc. credits</i>		<i>Persistence</i>		<i>Std. GPA</i>	
	(1) Second	(2) Sixth	(3) Second	(4) Sixth	(5) Second	(6) Sixth	(7) Second	(8) Sixth
<i>b) Business Administration</i>								
High School GPA	0.419*** (0.085)	0.538*** (0.083)	6.221*** (1.742)	15.889*** (5.186)	-0.011 (0.029)	0.070* (0.036)	0.941*** (0.081)	0.949*** (0.080)
HS degree Abitur	0.429 (0.294)	0.543* (0.281)	15.732** (6.655)	33.184* (18.691)	0.031 (0.104)	0.176 (0.124)	0.439* (0.258)	0.554** (0.259)
Abitur*HS GPA	-0.120 (0.119)	-0.149 (0.112)	-4.954* (2.542)	-9.712 (7.315)	-0.016 (0.041)	-0.062 (0.048)	-0.060 (0.102)	-0.099 (0.101)
Cohort FE	yes	yes	yes	yes	yes	yes	yes	yes
Study program FE	no	no	no	no	no	no	no	no
Controls	yes	yes	yes	yes	yes	yes	yes	yes
R^2	0.09	0.14	0.09	0.10	0.02	0.04	0.23	0.26
N	1,459	1,459	1,459	1,459	1,459	1,459	1,384	1,386

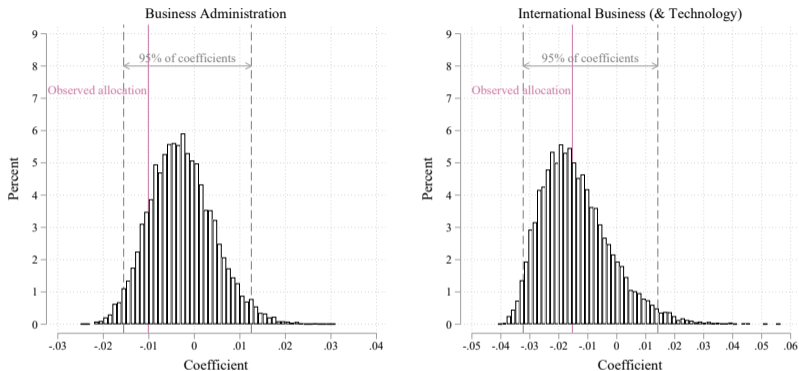
► Back

Regression of achievement on HS GPA and type of HS degree – IB & IBT

Semester	<i>Ach. ind.</i>		<i>Acc. credits</i>		<i>Persistence</i>		<i>Std. GPA</i>	
	(1) Second	(2) Sixth	(3) Second	(4) Sixth	(5) Second	(6) Sixth	(7) Second	(8) Sixth
<i>c) International Business (& Technology)</i>								
High School GPA	0.403** (0.175)	0.549*** (0.151)	16.135*** (3.861)	38.999*** (9.688)	0.039 (0.068)	0.141* (0.077)	1.026*** (0.132)	0.919*** (0.133)
HS degree Abitur	0.348 (0.538)	0.582 (0.482)	30.737** (12.023)	66.256** (31.231)	0.029 (0.197)	0.299 (0.241)	0.918** (0.460)	0.699 (0.444)
Abitur*HS GPA	-0.036 (0.199)	-0.106 (0.177)	-7.956* (4.226)	-15.698 (11.259)	0.023 (0.072)	-0.058 (0.088)	-0.244 (0.167)	-0.158 (0.163)
Cohort FE	yes	yes	yes	yes	yes	yes	yes	yes
Study program FE	no	no	no	no	no	no	no	no
Controls	yes	yes	yes	yes	yes	yes	yes	yes
R^2	0.11	0.17	0.15	0.18	0.05	0.09	0.32	0.31
N	440	440	440	440	440	440	403	405

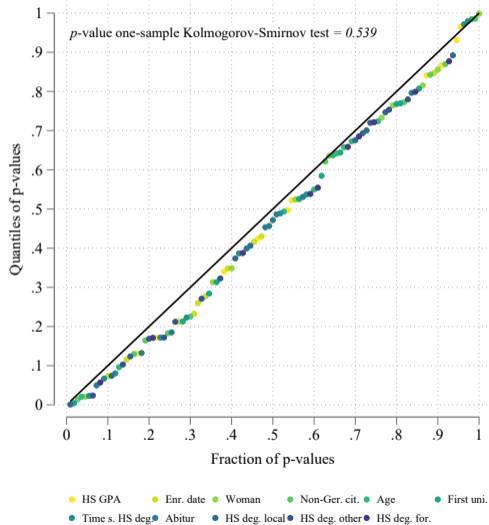
► Back

Regression of peer ability on students' own ability – permutation based test



Notes: In both panels, the solid line depicts the estimated coefficient from regressing peer high school GPA on own high school GPA controlling for selection pool FE based on the observed group allocation. In addition, in both panels, the distribution of the estimated coefficient under the null of random assignment within selection pools are plotted based on 10,000 rerandomizations that keep the selection pools as well as group sizes fixed.

P-values from regressing student characteristics on freshman group dummies



P-values from regressing student characteristics on freshman group dummies

Dependent variable	HS GPA	Enr. date	Woman	Non-Ger. cit.	Age	First uni.	Time s. HS	Abitur	HS deg. local	HS deg. oth.	HS deg. for.	N
<i>Business Administration</i>												
2016	[0.841]	[0.276]	[0.183]	[0.637]	[0.004]	[0.979]	[0.132]	[0.701]	[0.169]	[0.388]	[0.815]	341
2017	[0.497]	[0.073]	[0.843]	[0.724]	[0.585]	[0.172]	[0.453]	[0.406]	[0.720]	[0.659]	[0.525]	349
2018	[0.425]	[0.430]	[0.225]	[0.096]	[0.525]	[0.067]	[0.399]	[0.074]	[0.172]	[0.554]	[0.856]	370
2019	[0.867]	[0.848]	[0.014]	[0.494]	[0.313]	[0.489]	[0.050]	[0.374]	[0.780]	[0.721]	[0.349]	399
<i>International Business</i>												
2017	[0.522]	[0.115]	[0.986]	[0.984]	[0.770]	[0.080]	[0.472]	[0.676]	[0.323]	[0.057]	[0.764]	73
2018	[0.965]	[0.416]	[0.130]	[0.642]	[0.644]	[0.537]	[0.457]	[0.124]	[0.754]	[0.877]	[0.733]	68
2019	[0.340]	[0.348]	[0.621]	[0.021]	[0.213]	[0.387]	[0.486]	[0.001]	[0.271]	[0.538]	[0.021]	84
<i>International Business and Technology</i>												
2017	[0.931]	[0.233]	[0.870]	[0.550]	[0.807]	[0.023]	[0.797]	[0.747]	[0.024]	[0.799]	[0.636]	73
2018	[0.172]	[0.212]	[0.773]	[0.658]	[0.284]	[0.972]	[0.185]	[0.892]	[0.103]	[0.685]	[0.999]	67
2019	[0.131]	[0.260]	[0.165]	[0.673]	[0.768]	[0.223]	[0.531]	[0.694]	[0.212]	[0.171]	[0.313]	75

▶ Back

Regression of peer ability on students' own characteristics

	(1) Bus. Adm.	(2) Int. Bus. (& Tech)	(3) Full Sample
High school GPA	-0.026 (0.081)	0.075 (0.111)	-0.009 (0.008)
Enrollment date	0.000 (0.000)	0.001 (0.000)	0.000 (0.000)
Woman	0.002 (0.004)	-0.000 (0.006)	0.001 (0.003)
Non-German citizen	0.012* (0.007)	0.010 (0.007)	0.011** (0.005)
Age	0.000 (0.001)	-0.000 (0.001)	0.000 (0.001)
First uni. sem.	-0.000 (0.006)	0.012 (0.009)	0.002 (0.005)
Time since HS degree	-0.000 (0.001)	-0.001 (0.002)	-0.000 (0.001)
HS degree Abitur	-0.004 (0.004)	0.006 (0.010)	-0.002 (0.004)
HS degree local	0.002 (0.004)	0.016 (0.010)	0.005 (0.004)
HS degree other state	-0.014* (0.007)	0.014 (0.013)	-0.005 (0.006)
HS degree foreign	0.003 (0.009)	0.005 (0.010)	0.004 (0.007)
Cohort FE	yes	no	no
Cohort LOO mean	yes	no	no
Cohort*study program FE	no	yes	yes
Cohort*study program LOO mean	no	yes	yes
N	1,459	440	1,899

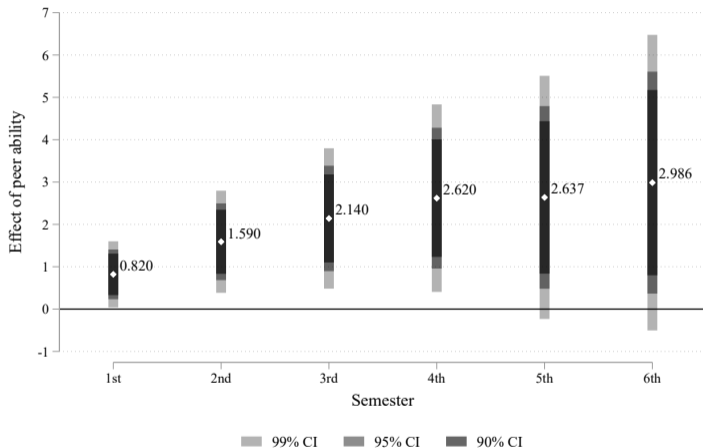
▶ Back

Effect of peer ability on academic achievement index – BuA

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Std(Peer HS GPA)	0.070*** (0.019)	0.080*** (0.022)	0.061** (0.023)	0.048** (0.022)	0.050** (0.022)	0.056** (0.026)
Std(HS GPA)	0.070** (0.029)	0.172*** (0.024)	0.195*** (0.027)	0.203*** (0.028)	0.213*** (0.029)	0.219*** (0.028)
R^2	0.05	0.10	0.11	0.12	0.13	0.14
N	1,459	1,459	1,459	1,459	1,459	1,459
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes

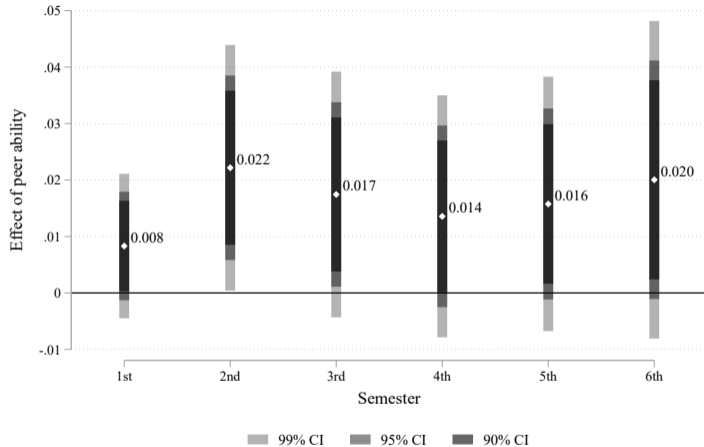
▶ Back

Effect of peer ability on accumulated credits – BuA



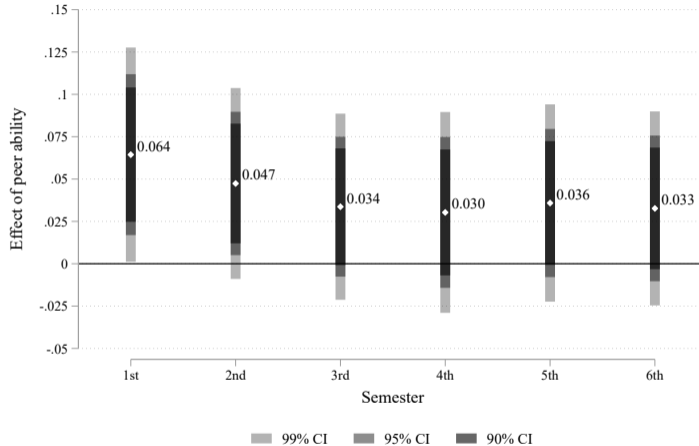
▶ Back

Effect of peer ability on persistence – BuA



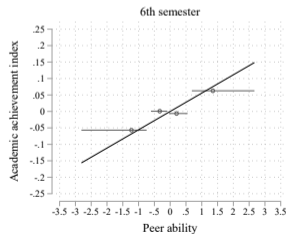
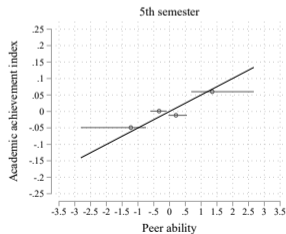
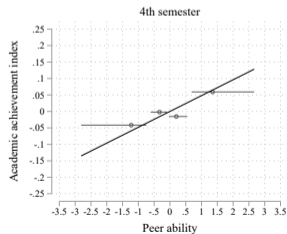
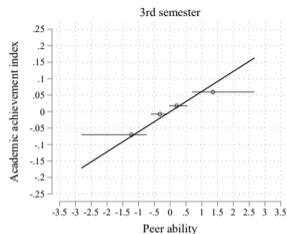
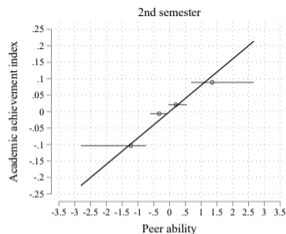
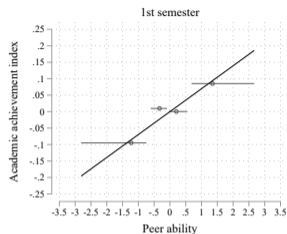
▶ Back

Effect of peer ability on standardized GPA – BuA



▶ Back

Binned scatterplots of the effect of peer ability – BuA



Nonlinear effects of peer ability on academic achievement index – BuA

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Frac. high ability peers	0.338 (0.264)	0.439 (0.268)	0.195 (0.249)	0.238 (0.240)	0.156 (0.241)	0.199 (0.273)
Frac. low ability peers	-0.535** (0.264)	-0.382 (0.316)	-0.420 (0.322)	-0.239 (0.305)	-0.328 (0.300)	-0.437 (0.348)
Frac. high - frac. low	0.873** (0.330)	0.821** (0.358)	0.616 (0.370)	0.478 (0.353)	0.484 (0.348)	0.636 (0.417)
<i>N</i>	1,459	1,459	1,459	1,459	1,459	1,459

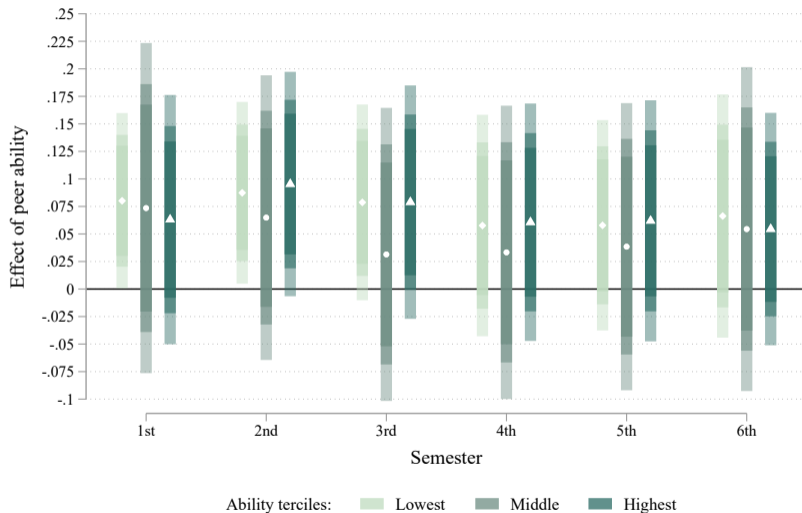
► Back

Effect of peer ability on achievement index by own ability – BuA

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Std(Peer HS GPA)	0.070*** (0.019)	0.080*** (0.022)	0.061** (0.023)	0.048** (0.022)	0.050** (0.022)	0.056** (0.026)
Std(HS GPA)	0.070** (0.029)	0.172*** (0.024)	0.195*** (0.027)	0.203*** (0.028)	0.213*** (0.029)	0.219*** (0.027)
Std(Peer HS GPA)*Std(HS GPA)	-0.005 (0.029)	0.010 (0.023)	0.007 (0.022)	-0.002 (0.023)	-0.000 (0.021)	-0.008 (0.021)
N	1,459	1,459	1,459	1,459	1,459	1,459

▶ Back

Effect of peer ability on achievement index by terciles of own ability – BuA



Effect of peer ability on achievement index by terciles of own ability – BuA

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Effect of Std(Peer HS GPA) in lowest tercile	0.080*** (0.030)	0.087*** (0.031)	0.079** (0.033)	0.058 (0.038)	0.058 (0.036)	0.066 (0.041)
Effect of Std(Peer HS GPA) in middle tercile	0.074 (0.056)	0.065 (0.048)	0.031 (0.050)	0.033 (0.050)	0.038 (0.049)	0.054 (0.055)
Effect of Std(Peer HS GPA) in highest tercile	0.063 (0.042)	0.095** (0.038)	0.079* (0.040)	0.061 (0.040)	0.062 (0.041)	0.054 (0.040)
P-value int. term	0.946	0.887	0.689	0.909	0.931	0.972
N	1,459	1,459	1,459	1,459	1,459	1,459
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes

► Back

Effect of peer ability on accumulated credits by terciles of own ability – BuA

	(1)	(2)	(3)	(4)	(5)	(6)
Semester	First	Second	Third	Fourth	Fifth	Sixth
Effect of Std(Peer HS GPA) in lowest tercile	0.883 (0.661)	1.468** (0.732)	1.920* (0.989)	2.185* (1.259)	1.623 (1.557)	1.895 (2.024)
Effect of Std(Peer HS GPA) in middle tercile	1.195*** (0.423)	1.758** (0.847)	2.396* (1.320)	3.308* (1.893)	3.826 (2.450)	4.306 (3.172)
Effect of Std(Peer HS GPA) in highest tercile	0.496 (0.467)	1.720** (0.821)	2.368* (1.207)	2.796* (1.598)	2.961 (2.053)	3.331 (2.471)
P-value int. term	0.620	0.948	0.939	0.894	0.745	0.815
N	1,459	1,459	1,459	1,459	1,459	1,459
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes

► Back

Effect of peer ability on persistence by terciles of own ability – BuA

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Effect of Std(Peer HS GPA) in lowest tercile	0.007 (0.007)	0.015 (0.013)	0.015 (0.016)	0.004 (0.019)	0.005 (0.018)	0.012 (0.021)
Effect of Std(Peer HS GPA) in middle tercile	0.011 (0.013)	0.024 (0.016)	0.013 (0.018)	0.020 (0.018)	0.026 (0.018)	0.033 (0.022)
Effect of Std(Peer HS GPA) in highest tercile	0.009 (0.009)	0.029** (0.013)	0.025* (0.013)	0.019 (0.015)	0.019 (0.015)	0.018 (0.016)
P-value int. term	0.953	0.740	0.803	0.836	0.766	0.813
N	1,459	1,459	1,459	1,459	1,459	1,459
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes

► Back

Effect of peer ability on GPA by terciles of own ability – BuA

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Effect of Std(Peer HS GPA) in lowest tercile	0.129*** (0.047)	0.097** (0.040)	0.088** (0.036)	0.083** (0.035)	0.089** (0.034)	0.078** (0.034)
Effect of Std(Peer HS GPA) in middle tercile	0.034 (0.051)	0.016 (0.051)	-0.005 (0.048)	-0.009 (0.049)	-0.007 (0.047)	0.001 (0.047)
Effect of Std(Peer HS GPA) in highest tercile	0.041 (0.035)	0.041 (0.039)	0.030 (0.039)	0.028 (0.040)	0.037 (0.040)	0.032 (0.037)
P-value int. term	0.173	0.362	0.224	0.230	0.218	0.355
N	1,377	1,384	1,386	1,386	1,386	1,386
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes

► Back

Robustness checks – wild cluster bootstrap

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Std(Peer HS GPA)	0.070	0.080	0.061	0.048	0.050	0.056
Model p-value	[0.001]***	[0.001]***	[0.010]**	[0.033]**	[0.025]**	[0.038]**
WCB p-value	[0.004]***	[0.003]***	[0.028]**	[0.061]*	[0.048]**	[0.060]*
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes
R^2	0.05	0.10	0.11	0.12	0.13	0.14
N	1,459	1,459	1,459	1,459	1,459	1,459

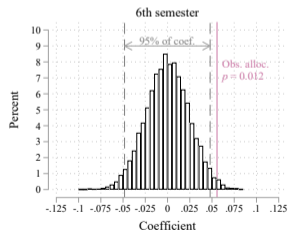
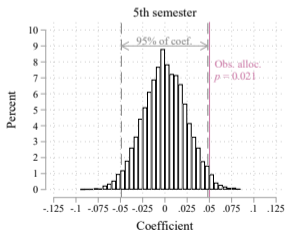
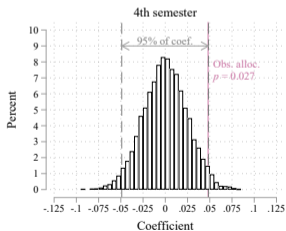
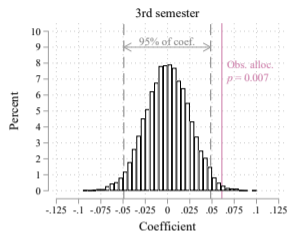
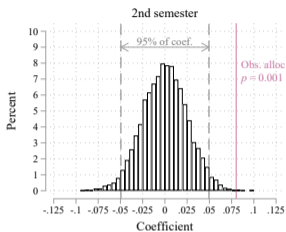
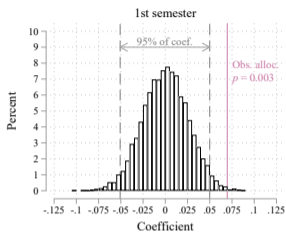
▶ Back

Robustness checks – non-clustered standard errors

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Std(Peer HS GPA)	0.070*** (0.027)	0.080*** (0.025)	0.061** (0.025)	0.048* (0.025)	0.050** (0.025)	0.056** (0.025)
Std(HS GPA)	0.070** (0.030)	0.172*** (0.030)	0.195*** (0.030)	0.203*** (0.029)	0.213*** (0.029)	0.219*** (0.028)
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes
R^2	0.05	0.10	0.11	0.12	0.13	0.14
N	1,459	1,459	1,459	1,459	1,459	1,459

▶ Back

Effect of peer ability on academic achievement index – perm. based inference



Robustness checks – without controls

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Std(Peer HS GPA)	0.068*** (0.019)	0.079*** (0.024)	0.059** (0.026)	0.045* (0.025)	0.046* (0.025)	0.052* (0.029)
Std(HS GPA)	0.094*** (0.027)	0.201*** (0.023)	0.226*** (0.024)	0.236*** (0.025)	0.244*** (0.025)	0.254*** (0.024)
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	no	no	no	no	no	no
R^2	0.01	0.05	0.05	0.06	0.06	0.07
N	1,459	1,459	1,459	1,459	1,459	1,459

▶ Back

Robustness checks – first letter of last name FE

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Std(Peer HS GPA)	0.074*** (0.019)	0.072*** (0.020)	0.052** (0.021)	0.038* (0.022)	0.039* (0.021)	0.046* (0.025)
Std(HS GPA)	0.074** (0.029)	0.172*** (0.024)	0.195*** (0.027)	0.202*** (0.028)	0.211*** (0.028)	0.216*** (0.027)
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes
First letter of last name FE	yes	yes	yes	yes	yes	yes
R^2	0.06	0.11	0.13	0.14	0.14	0.15
N	1,459	1,459	1,459	1,459	1,459	1,459

▶ Back

Robustness checks – other peer characteristics

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Std(Peer HS GPA)	0.091*** (0.017)	0.075*** (0.019)	0.056*** (0.019)	0.045** (0.018)	0.043** (0.018)	0.047** (0.021)
Std(HS GPA)	0.078** (0.030)	0.174*** (0.024)	0.198*** (0.027)	0.205*** (0.027)	0.213*** (0.028)	0.219*** (0.027)
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes
Peer controls	yes	yes	yes	yes	yes	yes
R^2	0.06	0.12	0.13	0.14	0.15	0.16
N	1,459	1,459	1,459	1,459	1,459	1,459

► Back

Robustness checks – heterogeneous peer effects by cohort*study prog. FE

	(1)	(2)	(3)	(4)	(5)	(6)
Semester	First	Second	Third	Fourth	Fifth	Sixth
Std(Peer HS GPA)	0.070*** (0.018)	0.080*** (0.021)	0.061*** (0.021)	0.048** (0.020)	0.050*** (0.019)	0.055*** (0.019)
Cohort FE	yes	yes	yes	yes	yes	yes
Std(Peer HS GPA)*(Cohort FE)	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes
Std(Peer HS GPA)*controls	no	no	no	no	no	no
R^2	0.05	0.10	0.11	0.13	0.14	0.15
N	1,459	1,459	1,459	1,459	1,459	1,459

▶ Back

Robustness checks – heterogeneous peer effects by all covariates

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Std(Peer HS GPA)	0.079*** (0.020)	0.094*** (0.022)	0.076*** (0.022)	0.061*** (0.021)	0.062*** (0.019)	0.068*** (0.020)
Cohort FE	yes	yes	yes	yes	yes	yes
Std(Peer HS GPA)*(Cohort FE)	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes
Std(Peer HS GPA)*controls	yes	yes	yes	yes	yes	yes
R^2	0.05	0.11	0.12	0.13	0.14	0.15
N	1,459	1,459	1,459	1,459	1,459	1,459

▶ Back

Robustness checks – MHT correction for index components

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
<i>a) Accumulated credits</i>						
Std(Peer HS GPA)	0.820	1.590	2.140	2.620	2.637	2.986
Model p-value	[0.007]	[0.001]	[0.001]	[0.003]	[0.017]	[0.026]
Sidak-Holm p-value	[0.021]	[0.003]	[0.003]	[0.008]	[0.051]	[0.077]
FDR q-value	[0.014]	[0.003]	[0.004]	[0.008]	[0.056]	[0.086]
N	1,459	1,459	1,459	1,459	1,459	1,459
<i>b) Persistence</i>						
Std(Peer HS GPA)	0.008	0.022	0.017	0.014	0.016	0.020
Model p-value	[0.088]	[0.009]	[0.037]	[0.096]	[0.067]	[0.062]
Sidak-Holm p-value	[0.088]	[0.017]	[0.072]	[0.184]	[0.130]	[0.121]
FDR q-value	[0.031]	[0.009]	[0.039]	[0.107]	[0.072]	[0.086]
N	1,459	1,459	1,459	1,459	1,459	1,459
<i>c) Standardized GPA</i>						
Std(Peer HS GPA)	0.064	0.047	0.034	0.030	0.036	0.033
Model p-value	[0.009]	[0.029]	[0.108]	[0.178]	[0.106]	[0.133]
Sidak-Holm p-value	[0.021]	[0.029]	[0.108]	[0.184]	[0.130]	[0.133]
FDR q-value	[0.014]	[0.014]	[0.059]	[0.135]	[0.077]	[0.098]
N	1,377	1,384	1,386	1,386	1,386	1,386
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes

Probability to have no study partners from freshman orientation

	<i>Survey sample</i>		<i>Main sample</i>		p-value (1) vs (4) (7)
	All (1)		All (4)		
Pr(isolated)	-		-		-
Woman	0.634		0.541		0.007
Non-German citizen	0.080		0.089		0.639
Age	22.086		21.934		0.531
High school GPA	2.437		2.492		0.103
Time since HS degree	2.010		1.990		0.915
HS degree Abitur	0.466		0.435		0.369
HS degree local	0.181		0.308		0.000
HS degree other state	0.080		0.074		0.752
HS degree foreign	0.034		0.042		0.553
First university	0.681		0.721		0.201
<i>N</i>	238		1,459		

▶ Back

Probability to have no study partners from freshman orientation

	<i>Survey sample</i>			<i>Main sample</i>	p-value (1) vs (4) (7)
	All (1)	Not isolated (2)	Isolated (3)	All (4)	
Pr(isolated)	-	-	-	-	-
Woman	0.634	0.686	0.583	0.541	0.007
Non-German citizen	0.080	0.076	0.083	0.089	0.639
Age	22.086	22.005	22.165	21.934	0.531
High school GPA	2.437	2.447	2.426	2.492	0.103
Time since HS degree	2.010	1.990	2.030	1.990	0.915
HS degree Abitur	0.466	0.551	0.383	0.435	0.369
HS degree local	0.181	0.178	0.183	0.308	0.000
HS degree other state	0.080	0.068	0.092	0.074	0.752
HS degree foreign	0.034	0.034	0.033	0.042	0.553
First university	0.681	0.729	0.633	0.721	0.201
<i>N</i>	238	118	120	1,459	

► Back

Probability to have no study partners from freshman orientation

	<i>Survey sample</i>			<i>Main sample</i>			p-value (1) vs (4) (7)
	All (1)	Not isolated (2)	Isolated (3)	All (4)	Low Pr(isol.) (5)	High Pr(isol.) (6)	
Pr(isolated)	-	-	-	-	0.411	0.651	-
Woman	0.634	0.686	0.583	0.541	0.693	0.388	0.007
Non-German citizen	0.080	0.076	0.083	0.089	0.064	0.114	0.639
Age	22.086	22.005	22.165	21.934	21.255	22.614	0.531
High school GPA	2.437	2.447	2.426	2.492	2.512	2.472	0.103
Time since HS degree	2.010	1.990	2.030	1.990	1.726	2.254	0.915
HS degree Abitur	0.466	0.551	0.383	0.435	0.714	0.156	0.369
HS degree local	0.181	0.178	0.183	0.308	0.248	0.369	0.000
HS degree other state	0.080	0.068	0.092	0.074	0.070	0.078	0.752
HS degree foreign	0.034	0.034	0.033	0.042	0.025	0.059	0.553
First university	0.681	0.729	0.633	0.721	0.810	0.632	0.201
<i>N</i>	238	118	120	1,459	730	729	

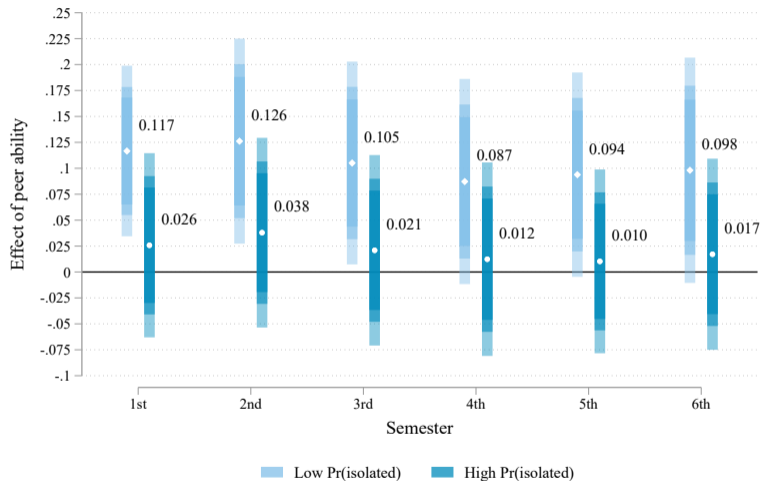
▶ Back

Logistic regression of isolation status on background char. – BuA, survey sample

	(1) Linear	(2) Quadratic	(3) Cubic
Woman	-0.342 (0.288)	-0.308 (0.294)	-0.340 (0.300)
Non-German citizen	0.000 (0.570)	-0.061 (0.578)	0.074 (0.590)
Age	-0.022 (0.064)	0.259 (0.493)	-6.460* (3.880)
High school GPA	0.151 (0.271)	1.033 (1.759)	-8.021 (7.702)
Time since HS degree	0.011 (0.083)	0.120 (0.149)	0.032 (0.303)
HS degree Abitur	-0.894*** (0.306)	-0.909*** (0.308)	-0.966*** (0.316)
HS degree local	0.024 (0.356)	0.064 (0.360)	0.069 (0.368)
HS degree other state	0.576 (0.524)	0.496 (0.528)	0.556 (0.534)
HS degree foreign	0.726 (0.906)	0.678 (0.924)	0.797 (0.958)
First university	-0.631* (0.325)	-0.508 (0.341)	-0.562 (0.356)
Age ²		-0.006 (0.010)	0.267* (0.156)
(High school GPA) ²		-0.167 (0.351)	3.874 (3.325)
(Time since HS degree) ²		-0.006 (0.013)	0.000 (0.063)
Age ³			-0.004* (0.002)
(High school GPA) ³			-0.573 (0.463)
(Time since HS degree) ³			0.001 (0.003)
Age p-value	[0.732]	[0.864]	[0.345]
High school GPA p-value	[0.578]	[0.675]	[0.532]
Time since HS degree p-value	[0.896]	[0.697]	[0.645]
Pseudo R ²	0.04	0.05	0.07
χ^2 p-value	[0.147]	[0.193]	[0.084]
N	238	238	238

▶ Back

Effects of peer ability on achievement index by isolation probability – BuA



▶ Back

▶ Descriptives

▶ Prediction models

▶ Table

▶ Robustness

▶ Choice of specialization

Effect of peer ability on achievement index by isolation probability – BuA

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Effect of Std(Peer HS GPA) for low Pr(isolated)	0.117*** (0.031)	0.126*** (0.037)	0.105*** (0.037)	0.087** (0.037)	0.094** (0.037)	0.098** (0.041)
Effect of Std(Peer HS GPA) for high Pr(isolated)	0.026 (0.033)	0.038 (0.034)	0.021 (0.034)	0.012 (0.035)	0.010 (0.033)	0.017 (0.035)
Low Pr(isolated) - high Pr(isolated)	0.091* (0.052)	0.088 (0.057)	0.084 (0.055)	0.075 (0.058)	0.084 (0.056)	0.081 (0.055)
N	1,459	1,459	1,459	1,459	1,459	1,459
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes

► Back

Effect of peer ability on accumulated credits by isolation probability – BuA

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Effect of Std(Peer HS GPA) for low Pr(isolated)	1.409*** (0.378)	2.365*** (0.651)	3.507*** (1.014)	4.575*** (1.419)	4.801** (1.847)	5.351** (2.257)
Effect of Std(Peer HS GPA) for high Pr(isolated)	0.282 (0.418)	0.883 (0.731)	0.893 (1.055)	0.830 (1.481)	0.654 (1.842)	0.824 (2.224)
Low Pr(isolated) - high Pr(isolated)	1.126** (0.539)	1.481 (1.050)	2.615 (1.669)	3.745 (2.410)	4.147 (3.038)	4.527 (3.684)
<i>N</i>	1,459	1,459	1,459	1,459	1,459	1,459
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes

► Back

Effect of peer ability on persistence by isolation probability – BuA

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Effect of Std(Peer HS GPA) for low Pr(isolated)	0.015** (0.007)	0.034** (0.014)	0.028** (0.013)	0.022 (0.014)	0.028* (0.015)	0.032* (0.018)
Effect of Std(Peer HS GPA) for high Pr(isolated)	0.002 (0.009)	0.011 (0.013)	0.008 (0.013)	0.006 (0.014)	0.004 (0.014)	0.009 (0.015)
Low Pr(isolated) - high Pr(isolated)	0.013 (0.012)	0.024 (0.021)	0.021 (0.021)	0.017 (0.023)	0.024 (0.024)	0.022 (0.026)
<i>N</i>	1,459	1,459	1,459	1,459	1,459	1,459
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes

► Back

Effect of peer ability on GPA by isolation probability – BuA

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Effect of Std(Peer HS GPA) for low Pr(isolated)	0.096** (0.040)	0.071* (0.035)	0.059* (0.033)	0.055 (0.033)	0.063* (0.033)	0.062* (0.031)
Effect of Std(Peer HS GPA) for high Pr(isolated)	0.035 (0.036)	0.026 (0.032)	0.011 (0.033)	0.009 (0.034)	0.011 (0.035)	0.006 (0.033)
Low Pr(isolated) - high Pr(isolated)	0.062 (0.060)	0.044 (0.052)	0.048 (0.052)	0.046 (0.051)	0.052 (0.052)	0.056 (0.048)
<i>N</i>	1,377	1,384	1,386	1,386	1,386	1,386
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes

► Back

Effect of peer ability on ach. index by isolation prob. – BuA, robustness

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
<i>a) Prediction with linear terms for continuous variables</i>						
Effect of Std(Peer HS GPA) for low Pr(isolated)	0.112*** (0.031)	0.108*** (0.035)	0.090** (0.036)	0.072* (0.037)	0.077** (0.036)	0.080** (0.036)
Effect of Std(Peer HS GPA) for high Pr(isolated)	0.029 (0.037)	0.054 (0.037)	0.035 (0.039)	0.026 (0.037)	0.027 (0.038)	0.034 (0.043)
Low Pr(isolated) - high Pr(isolated)	0.083 (0.055)	0.054 (0.057)	0.055 (0.058)	0.046 (0.058)	0.049 (0.060)	0.046 (0.060)
<i>b) Prediction with quadratic terms for continuous variables</i>						
Effect of Std(Peer HS GPA) for low Pr(isolated)	0.118*** (0.028)	0.116*** (0.031)	0.105*** (0.033)	0.094*** (0.032)	0.097*** (0.030)	0.102*** (0.035)
Effect of Std(Peer HS GPA) for high Pr(isolated)	0.026 (0.032)	0.049 (0.032)	0.022 (0.032)	0.007 (0.030)	0.008 (0.030)	0.014 (0.032)
Low Pr(isolated) - high Pr(isolated)	0.092* (0.047)	0.067 (0.047)	0.084* (0.047)	0.087* (0.045)	0.090** (0.043)	0.089** (0.042)
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes
N	1,459	1,459	1,459	1,459	1,459	1,459

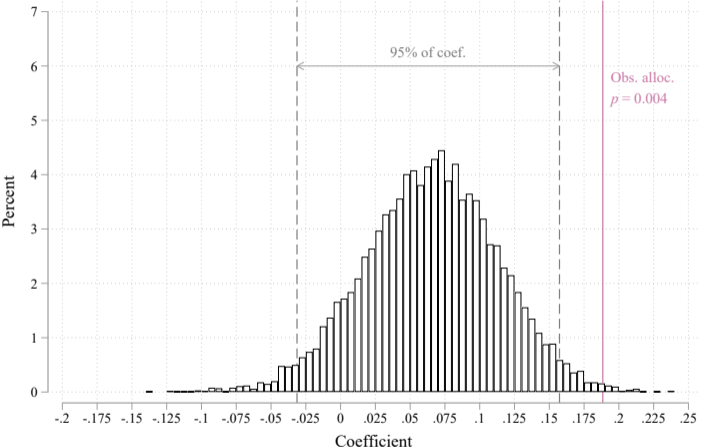
▶ Back

Association between students' specialization choices – BuA

	(1)	(2)
Fraction of peers	0.167*** (0.047)	0.188*** (0.048)
Cohort FE	yes	no
Specialization FE	yes	yes
Student FE	no	yes
<i>N</i>	23,344	23,344
<i>N_S</i>	1,459	1,459

▶ Back

Association between students' specialization choices – BuA



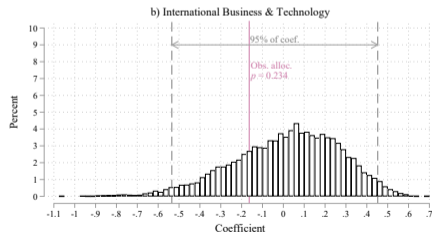
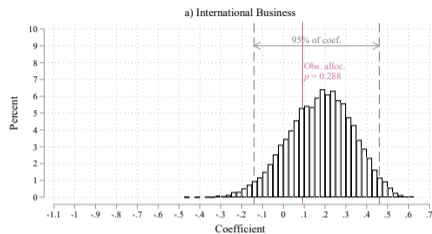
▶ Back

Association between students' language and minor choices – IB & IBT

	<i>Int. Bus.</i>		<i>Int. Bus. & Tech</i>	
	(1)	(2)	(3)	(4)
Fraction of peers	0.057 (0.190)	0.092 (0.195)	-0.234 (0.281)	-0.164 (0.272)
Cohort FE	yes	no	yes	no
Language/minor FE	yes	yes	yes	yes
Student FE	no	yes	no	yes
<i>N</i>	900	900	645	645
<i>N</i> ₅	225	225	215	215

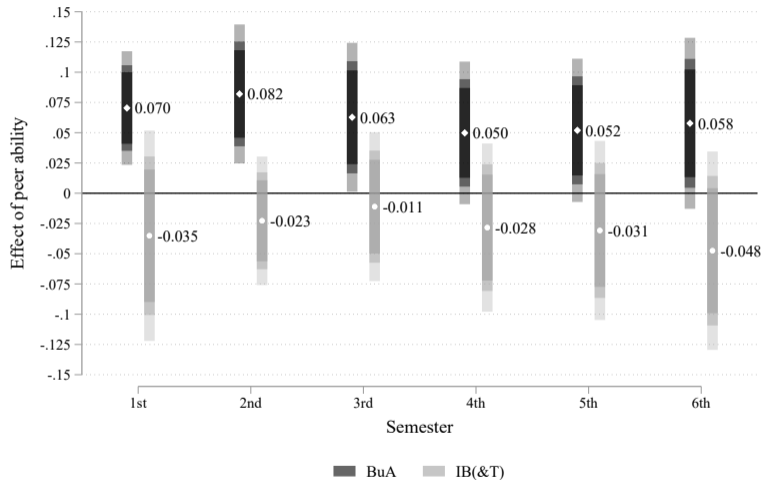
▶ Back

Association between students' language and minor choices – IB & IBT



▶ Back

Effect of peer ability on academic achievement index – by study programs



► Table

► Minor and language choices

► Back

Effect of peer ability on academic achievement index – by study programs

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Effect of Std(Peer HS GPA) in BuA	0.070*** (0.018)	0.082*** (0.022)	0.063*** (0.023)	0.050** (0.022)	0.052** (0.022)	0.058** (0.027)
Effect of Std(Peer HS GPA) in IB(&T)	-0.035 (0.033)	-0.023 (0.020)	-0.011 (0.023)	-0.028 (0.026)	-0.031 (0.028)	-0.048 (0.031)
BuA - IB(&T)	0.106*** (0.038)	0.105*** (0.029)	0.074** (0.033)	0.078** (0.034)	0.083** (0.036)	0.105** (0.040)
<i>N</i>	1,899	1,899	1,899	1,899	1,899	1,899
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes

► Back

Effect of peer ability on accumulated credits – by study programs

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Effect of Std(Peer HS GPA) in BuA	0.773** (0.357)	1.594*** (0.518)	2.144*** (0.692)	2.639*** (0.912)	2.673** (1.133)	2.981** (1.394)
Effect of Std(Peer HS GPA) in IB(&T)	0.290 (1.373)	-0.227 (1.713)	-0.268 (2.240)	-1.103 (2.890)	-1.063 (2.987)	-3.358 (4.355)
BuA - IB(&T)	0.483 (1.408)	1.822 (1.768)	2.412 (2.311)	3.741 (2.993)	3.736 (3.165)	6.339 (4.520)
<i>N</i>	1,899	1,899	1,899	1,899	1,899	1,899
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes

► Back

Effect of peer ability on persistence – by study programs

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Effect of Std(Peer HS GPA) in BuA	0.008* (0.004)	0.023*** (0.008)	0.018** (0.008)	0.014* (0.008)	0.016* (0.009)	0.021* (0.011)
Effect of Std(Peer HS GPA) in IB(&T)	-0.018 (0.011)	-0.020 (0.014)	-0.012 (0.016)	-0.024 (0.020)	-0.030 (0.020)	-0.036 (0.023)
BuA - IB(&T)	0.026** (0.012)	0.043*** (0.016)	0.030 (0.018)	0.038* (0.021)	0.046** (0.021)	0.057** (0.025)
<i>N</i>	1,899	1,899	1,899	1,899	1,899	1,899
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes

► Back

Effect of peer ability on GPA – by study programs

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Effect of Std(Peer HS GPA) in BuA	0.067*** (0.025)	0.049** (0.021)	0.035* (0.020)	0.031 (0.022)	0.036 (0.022)	0.032 (0.021)
Effect of Std(Peer HS GPA) in IB(&T)	-0.002 (0.046)	0.012 (0.040)	0.013 (0.042)	0.024 (0.041)	0.029 (0.041)	0.022 (0.044)
BuA - IB(&T)	0.069 (0.052)	0.037 (0.045)	0.022 (0.046)	0.007 (0.046)	0.006 (0.046)	0.011 (0.048)
<i>N</i>	1,770	1,787	1,790	1,791	1,791	1,791
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes

► Back

Effect of peer ability on achievements index – by study programs, robustness

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Effect of Std(Peer HS GPA) in BuA	0.074*** (0.020)	0.089*** (0.022)	0.071*** (0.024)	0.059*** (0.022)	0.061*** (0.022)	0.069** (0.027)
Effect of Std(Peer HS GPA) in IB(&T)	-0.044 (0.038)	-0.034 (0.028)	-0.024 (0.028)	-0.044 (0.030)	-0.047 (0.032)	-0.072** (0.033)
BuA - IB(&T)	0.118** (0.047)	0.123*** (0.039)	0.094** (0.040)	0.103** (0.039)	0.108*** (0.040)	0.141*** (0.046)
N	1,899	1,899	1,899	1,899	1,899	1,899
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes
Std(Peer HS GPA)*controls	yes	yes	yes	yes	yes	yes

► Back

Background characteristics by study program and Int. Bus. (& Tech.) probability

	<i>Business Administration</i>		<i>Int. Bus. (& Tech.)</i>	p-value	p-value
	Low Pr(IB(&T)) (1)	High Pr(IB(&T)) (2)	(3)	(1) vs (3) (4)	(2) vs (3) (5)
IB(&T) probability	0.100	0.277	0.375	0.000	0.000
Woman	0.637	0.444	0.500	0.000	0.061
Non-German citizen	0.052	0.126	0.218	0.000	0.000
Age	22.492	21.374	21.230	0.000	0.388
High school GPA	2.272	2.713	2.891	0.000	0.000
Time since HS degree	2.229	1.750	1.676	0.001	0.542
HS degree Abitur	0.175	0.696	0.698	0.000	0.963
HS degree local	0.345	0.272	0.241	0.000	0.241
HS degree other state	0.027	0.121	0.123	0.000	0.925
HS degree foreign	0.001	0.082	0.200	0.000	0.000
First university	0.705	0.738	0.770	0.014	0.209
<i>N</i>	731	728	440		

▶ Back

Effect of peer ability on index among BuA students – by IB/IBT probability

Semester	(1) First	(2) Second	(3) Third	(4) Fourth	(5) Fifth	(6) Sixth
Effect of Std(Peer HS GPA) for low Pr(IB(&T))	0.034 (0.032)	0.053 (0.033)	0.034 (0.033)	0.020 (0.034)	0.023 (0.032)	0.033 (0.033)
Effect of Std(Peer HS GPA) for high Pr(IB(&T))	0.104** (0.043)	0.105** (0.042)	0.087** (0.043)	0.074* (0.041)	0.076* (0.040)	0.076* (0.044)
Low Pr(IB(&T)) - high Pr(IB(&T))	-0.069 (0.065)	-0.052 (0.062)	-0.053 (0.062)	-0.054 (0.061)	-0.053 (0.057)	-0.043 (0.058)
<i>N</i>	1,459	1,459	1,459	1,459	1,459	1,459
Cohort FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes

► Back

References i

- Anderson, Michael L. (2008). **“Multiple Inference and Gender Differences in the Effects of Early Intervention: A Reevaluation of the Abecedarian, Perry Preschool, and Early Training Projects”**. In: *Journal of the American Statistical Association* 103.484, pp. 1481–1495.
- Back, Mitja D., Stefan C. Schmukle, and Boris Egloff (2008). **“Becoming Friends by Chance”**. In: *Psychological Science* 19.5, p. 439.
- Bandiera, Oriana, Iwan Barankay, and Imran Rasul (2010). **“Social Incentives in the Workplace”**. In: *Review of Economic Studies* 77.2, pp. 417–458.
- Booij, Adam S., Edwin Leuven, and Hessel Oosterbeek (2017). **“Ability Peer Effects in University: Evidence from a Randomized Experiment”**. In: *Review of Economic Studies* 84.2, pp. 547–578.
- Cai, Jing and Adam Szeidl (2018). **“Interfirm Relationships and Business Performance”**. In: *Quarterly Journal of Economics* 133.3, pp. 1229–1282.
- Carrell, Scott E., Richard L. Fullerton, and James E. West (2009). **“Does Your Cohort Matter? Measuring Peer Effects in College Achievement”**. In: *Journal of Labor Economics* 27.3, pp. 439–464.

References ii

- Carrell, Scott E., Bruce I. Sacerdote, and James E. West (2013). **“From Natural Variation to Optimal Policy? The Importance of Endogenous Peer Group Formation”**. In: *Econometrica* 81.3, pp. 855–882.
- Conley, Timothy G. et al. (2024). **“Social Interactions, Mechanisms, and Equilibrium: Evidence from a Model of Study Time and Academic Achievement”**. In: *Journal of Political Economy* 132.3, pp. 723–1063.
- Corno, Lucia, Eliana La Ferrara, and Justine Burns (2022). **“Interaction, Stereotypes, and Performance: Evidence from South Africa”**. In: *American Economic Review* 112.12, pp. 3848–3875.
- Coveney, Max and Matthijs Oosterveen (2021). **“What Drives Ability Peer Effects?”** In: *European Economic Review* 136, p. 103763.
- Destatis (2022). *Bildung und Kultur: Studierende an Hochschulen Wintersemester 2021/2022*. Statistisches Bundesamt.
- Duflo, Esther, Pascaline Dupas, and Michael Kremer (2011). **“Peer Effects, Teacher Incentives, and the Impact of Tracking: Evidence from a Randomized Evaluation in Kenya”**. In: *American Economic Review* 101.5, pp. 1739–74.
- Feld, Jan and Ulf Zölitz (2017). **“Understanding Peer Effects: On the Nature, Estimation, and Channels of Peer Effects”**. In: *Journal of Labor Economics* 35.2, pp. 387–428.

References iii

- Feygin, Amy et al. (2022). **“Advising for College Success: Policies, Practices, and Programs That Support Students on the Path to College Completion”**. In: *College Completion Network*.
- Fischer, Thomas and Johannes Rode (2020). **“Classroom or Pub – Where are Persistent Peer Relationships Between University Students Formed?”** In: *Journal of Economic Behavior & Organization* 178, pp. 474–493.
- Frakes, Michael D. and Melissa F. Wasserman (2021). **“Knowledge Spillovers, Peer Effects, and Telecommuting: Evidence from the US Patent Office”**. In: *Journal of Public Economics* 198, p. 104425.
- Garlick, Robert (2018). **“Academic Peer Effects with Different Group Assignment Policies: Residential Tracking versus Random Assignment”**. In: *American Economic Journal: Applied Economics* 10.3, pp. 345–369.
- Humlum, Maria Knoth and Mette Thorsager (2021). **“The Importance of Peer Quality for Completion of Higher Education”**. In: *Economics of Education Review* 83, p. 102120.
- Lavy, Victor, M. Daniele Paserman, and Analia Schlosser (2012). **“Inside the Black Box of Ability Peer Effects: Evidence from Variation in the Proportion of Low Achievers In the Classroom”**. In: *Economic Journal* 122.559, pp. 208–237.

References iv

- Lavy, Victor and Analia Schlosser (2011). **“Mechanisms and Impacts of Gender Peer Effects at School”**. In: *American Economic Journal: Applied Economics* 3.2, pp. 1–33.
- List, John A. (2020). **“Non est Disputandum de Generalizability? A Glimpse into The External Validity Trial”**. In: *NBER Working Paper No. 27535*.
- Mas, Alexandre and Enrico Moretti (2009). **“Peers at Work”**. In: *American Economic Review* 99.1, pp. 112–145.
- Nielsen, Helena Skyt and Michael Svarer (2009). **“Educational Homogamy: How Much is Opportunities?”** In: *Journal of Human Resources* 44.4, pp. 1066–1086.
- Sacerdote, Bruce (2014). **“Experimental and Quasi-Experimental Analysis of Peer Effects: Two Steps Forward?”** In: *Annual Review of Economics* 6.1, pp. 253–272.
- Sandvik, Jason J. et al. (2020). **“Workplace Knowledge Flows”**. In: *Quarterly Journal of Economics* 135.3, pp. 1635–1680.
- Tan, Tom Fangyun and Serguei Netessine (2019). **“When You Work with a Superman, Will You Also Fly? An Empirical Study of the Impact of Coworkers on Performance”**. In: *Management Science* 65.8, pp. 3495–3517.

References v

Thiemann, Petra (2022). **“The Persistent Effects of Short-Term Peer Groups on Performance: Evidence from a Natural Experiment in Higher Education”**. In: *Management Science* 68.2, pp. 1131–1148.

Villeval, Marie Claire (2020). **“Performance Feedback and Peer Effects”**. In: *Handbook of Labor, Human Resources and Population Economics*. Ed. by Klaus F. Zimmermann. Cham: Springer, pp. 1–38.