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# To Benefit From an Educational Program, You Need to Participate. Participation Patterns in an Educational Intervention Promoting College Access

## Abstract

*The number of extracurricular educational programs has risen in recent decades throughout Europe. The effect of such interventions depends on the extent to which different groups participate in the programs. Hence, we study whether we can observe the emergence of unfavorable participation patterns with regard to students in need of extra support in a college counseling program fostering college access and whether the unfavorable participation pattern results from selection by the teachers or from self-selection by the students. The investigated group includes 528 students who were randomly assigned to the treatment condition as part of a randomized controlled trial. Our results show that students in need of extra support (low college-going intentions and low academic achievement) are much less likely to participate in the program than the respective comparison groups, due to both forms of selection. We discuss possible consequences of this participation pattern on the program's effect on educational disparities.*

## Keywords

*educational inequality, educational interventions, participation, randomized controlled trials*

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# Um von einem Bildungsprogramm zu profitieren, muss man daran teilnehmen: Teilnahmemuster in einer Bildungsintervention zur Förderung der Studienaufnahme

**Zusammenfassung**

*In den letzten Jahrzehnten ist die Zahl außercurricularer Bildungsprogramme europaweit stark gestiegen. Der Einfluss solcher Interventionen auf den Bildungserfolg hängt stark davon ab, in welchem Ausmaß verschiedene Gruppen daran teilnehmen. Entsprechend untersuchen wir, ob ein ungünstiges Teilnahmemuster von besonders förderbedürftigen Schüler:innen in einem Beratungsprogramm, das auf die Förderung der Studienaufnahme zielt, zu beobachten ist und ob dieses Teilnahmemuster auf die Fremdselektion durch Lehrer:innen oder auf eine Selbstselektion der Schüler:innen zurückgeht. Die untersuchte Gruppe umfasst 528 Schüler:innen, die im Rahmen einer kontrolliert-randomisierten Studie zufällig der Programmgruppe zugeordnet worden sind. Unsere Ergebnisse zeigen, dass besonders förderbedürftige Schüler:innen mit niedriger Studienintention und niedrigen akademischen Leistungen deutlich seltener am Programm teilnehmen als die jeweiligen Vergleichsgruppen, wofür beide Arten der Selektion verantwortlich sind. Abschließend diskutieren wir mögliche Konsequenzen dieses Teilnahmemusters für das ungleichheitsreduzierende Potenzial des Programms.*

**Schlagworte**

*Bildungsungleichheit, Bildungsinterventionen, Teilnahme, kontrolliert-randomisierte Studien*

## 1. Introduction

People's educational outcomes increasingly depend not only on the structure of the formal education system but also on whether they participate in extracurricular educational interventions. Across Europe, recent decades have seen the implementation of numerous educational programs designed to promote the educational outcomes of high school students and young adults during and after secondary school (e.g., Sultana, 2004; Watts & Sultana, 2004). Most prominent among them are interventions to promote higher education access and success (for an overview, see Herbaut & Geven, 2020). Educational sociologists were quick to note this trend and analyzed the effects of such programs. They looked at how participating in an intervention affects students' educational outcomes by identifying the average treatment effect (e.g., Barone et al., 2017; Ehlert et al., 2017). Although not all programs could be shown to have a positive impact on educational outcomes, interventions involving one-on-one counseling emerged as particularly effective in encouraging students to pursue a college career (for an overview, see Herbaut & Geven, 2020).

For these interventions to be effective, however, it is equally important what types of persons participate in them. If young people in need of extra support systematically stay away from such programs, the interventions are especially likely to consolidate educational inequalities and forego opportunities for improving educational outcomes. The risk of such an unfavorable composition of participants is especially high with programs that offer individualized counseling to promote college attendance, as participation in such programs is voluntary in most cases. Medical and economic researchers widely agree that an unfavorable composition of participants may have a major impact on an intervention's effects. Accordingly, there is a sizable body of research on participation patterns in interventions to promote health and to facilitate labor market entry, providing evidence of unfavorable participation patterns (e.g., Ahmed et al., 2010; Aizer, 2003; Heckmann & Smith, 2004; Hoeck et al., 2014; Noguchi et al., 2007; Palència et al., 2010; Veugelers & Yip, 2003; Zackrisson et al., 2003).

In the sociology of education, by contrast, similar studies on the composition of participants in educational interventions are largely non-existent. Only few studies investigated the broader topic of targeting marginal students, that is, which groups of students should be targeted by educational programs to maximize the programs' impact on college enrollment (e.g., Martini et al., 2021, p. 835; Modena et al., 2020). As a consequence, little is known about what types of secondary school students participate in individualized college counseling programs and whether students in need of extra support are systematically underrepresented. The present study addresses this research question. Specifically, we study the example of one college counseling program in Germany to examine whether students in need of extra support are underrepresented in individualized counseling programs offered on a voluntary basis.

There are two reasons why this question is important. First, if there is an unfavorable composition of participants, interventions may reinforce inequalities. Specifically, the inequality effect depends on the extent to which various social groups are represented in the programs and the extent to which the intervention in fact works to improve the educational outcomes of the participating groups (Pietrzyk & Erdmann, 2020). Accordingly, inequalities between students in need of extra support and those without extra needs may be exacerbated by educational programs if students needing extra support are underrepresented. In this case, the participation pattern may unintentionally serve as a new mechanism for reinforcing educational disparities.

Second, a program that rarely reaches individuals in need of extra support falls short of making full use of its potential to improve educational outcomes. After all, the participation effect is generally higher if participants need extra support. Empirical studies show that secondary school students with low academic achievement (Barr & Castleman, 2017), low initial educational aspirations (Myers et al., 2004), low pretreatment levels of information (Hastings et al., 2015), low levels of commitment (Carrell & Sacerdote, 2013), and low social background (Bonilla et al., 2017;

Castleman et al., 2014; Ford et al., 2014; Hastings et al., 2015; Kerr et al., 2015; McGuigan et al., 2016) benefit more strongly from college-going interventions than students in the respective comparison groups. If students in need of extra support are systematically underrepresented, the intervention does not fully exploit its potential in terms of promoting higher education access.

Given this relevance, we examine whether secondary school students in need of extra support are less likely to participate in a specific individual college counseling intervention based in Germany. For this analysis, we use data gathered as part of the study *Future and Career Plans Before High School Graduation* (Pietrzyk et al., 2019), a randomized controlled trial to evaluate an educational intervention. To analyze participation behavior, we look at whether students who were randomly and individually assigned to the treatment condition actually participated in the program. In this analysis, we can distinguish whether teachers are less likely to point out the opportunity of participating in the program to certain groups of students (selection by others) and whether certain groups of students are more likely to decide against participation (self-selection). Furthermore, we have access to student survey data collected prior to the intervention, which we use to gather information on their need for extra support.

Our study thus contributes to existing research in three ways: First, we substantially expand the state of research on participation patterns in educational interventions involving individual and voluntary participation. With regard to interventions promoting higher education access, one U.S. study previously investigated participation patterns, concluding that such interventions suffer from an unfavorable composition of participants. Students with low self-esteem and a small number of books in the household, for example, are less likely to participate in the intervention (McGuigan et al., 2016, pp. 497–498). Broader research is needed, however, to assess whether such interventions tend to reinforce educational disparities and forego the opportunity to improve educational outcomes. Second, based on our multi-dimensional definition of need for extra support, we capture participation patterns in a detailed manner, breaking down the groups of students who are underrepresented. Third, the distinction between self-selection and selection by others allows us to identify the junctures at which program officers should counteract an unfavorable composition of participants to mitigate effects that reinforce existing inequalities.

In the following, we define need for extra support and explain why unfavorable mechanisms of self-selection and selection by others may emerge based on that need. We then present the research design by describing the intervention investigated here, our data and analytical strategy, as well as our operationalizations followed by a presentation of our results. The results show that students in need of extra support are in fact underrepresented in this specific educational program with processes of both self-selection and selection by others at work. Finally, we discuss the implications of our findings.

# 2. Need for Extra Support

## 2.1 Definition of Need for Extra Support

The primary goal of educational programs promoting college access is to encourage young people who, without participating in the program, would likely not pursue a college career to consider enrolling in a higher education institution. Accordingly, we can define different dimensions of the need for extra support based on key predictors of college attendance.

The most important predictor of college attendance is students' college-going intention – that is, their subjective assessment of the likelihood of their going to college after graduating from high school. If they already have a strong intention prior to the intervention, they are very likely to pursue a college education without participating in that intervention; that is, they are not in need of extra support in the abovementioned sense. This reasoning is supported by a number of empirical studies, which show the participation effect of educational interventions to be particularly strong among students with low educational aspirations, whereas no effect on college-going patterns was found for students with high aspirations (Myers et al., 2004; with ambiguous results: Ehlert et al., 2017).

Furthermore, college enrollment depends on students' academic performance in the final two years of high school. In the German *Abitur* program, the German higher education entrance qualification, these two years offer the most rigorous coursework, and students' grades count towards their final grade point average (GPA). Depending on that final GPA, college attendance rates are found to vary widely. Whereas 80 to 95 percent of graduates with excellent Abitur results (1.0–1.9 on a scale of 1.0 to 4.0 where 1.0 is best) go on to pursue a college degree, that proportion is 60 to 80 percent among graduates with good results (2.0–2.9) and under 40 to 60 percent among graduates with satisfactory results (3.0–4.0; Autorengruppe Bildungsberichterstattung, 2016). Accordingly, students' need for extra support varies depending on their academic achievement. Again, empirical studies provide evidence that high school grades translate into different effects of participating in an educational intervention. Intervention effects are found to be particularly strong for students with low academic achievement (Barr & Castleman, 2017; with ambiguous results: Bonilla et al., 2017; Myers et al., 2004).

What is more, the college-going decisions of young people with a higher education entrance qualification are often shaped by their educational background. The difference between Abitur graduates with and without an academic background is about 10 percentage points (Autorengruppe Bildungsberichterstattung, 2016; see also Hillmert & Jacob, 2003). Accordingly, students from non-academic backgrounds have a higher need for extra support than those from academic backgrounds. Again, this link is confirmed by empirical studies, which find a stronger participation effect for young people with low educational and social backgrounds than for the comparison group of students from high educational or social back-

grounds (Bonilla et al., 2017; Castleman et al., 2014; Ford et al., 2014; Hastings et al., 2015; Kerr et al., 2015; McGuigan et al., 2016).

Against this backdrop, we define students as being in need for extra support if they are marked by low initial college-going intentions, low academic achievement, or low educational background.

## 2.2 Self-Selection and Selection by Others With Respect to the Need for Extra Support

Whether or not people participate in a voluntary individual intervention depends in large part on whether they consider themselves to be the target group for that intervention (e.g., Heckman & Smith, 2004). Aside from whether students think of themselves as a target group, another key factor in a high school context is whether important gate keepers – above all, teachers – think of certain groups of students as being the target group. These gate keepers are in a position to make students aware of the opportunity to participate in a program, and they can motivate them to do so. Both students and teachers may have a biased perception of who is the intended target group for college counseling interventions, because such interventions typically address multiple target groups, which are hierarchically structured. However, the anticipated benefits of program participation presumably vary between target groups.

Aside from their primary goal of encouraging more students to pursue higher education, many college counseling programs have the secondary goal of optimizing participants' college and career trajectories. For example, programs may have an additional focus on encouraging participants to choose fields of study with strong labor market rewards (e.g., Barone et al., 2017; Hastings et al., 2015), and to apply to competitive institutions (e.g., Bonilla et al., 2017), and on promoting successful college completion (e.g., Barr & Castleman, 2017; Bos et al., 2012; Carrell & Sacerdote, 2013; Castleman et al., 2014; Ford et al., 2014; Myers et al., 2004). The secondary target group thus consists of students likely to go to college regardless of their participation in the intervention – that is, students not in need of extra support as defined above.

For the participation pattern with respect to students in need for extra support, this dual goal may be problematic insofar as the intuitively anticipated benefit of program participation is likely to be lower for young people in need of extra support in the primary target group than it is for young adults not in need of extra support in the secondary target group. That is, because students as well as teachers can be assumed to anticipate relatively strong benefits from program participation for the secondary target group, as the program supports them on a career path they are very likely to pursue. The primary target group, by contrast, receives guidance about an educational path that they may or may not pursue. So even if the primary target group, according to previous research findings, is likely to benefit more from program participation in terms of college access than the secondary target group

(e.g., Barr & Castleman, 2017; Bonilla et al., 2017; Castleman et al., 2014; Ford et al., 2014; Hastings et al., 2015; Kerr et al., 2015; McGuigan et al., 2016; Myers et al., 2004), the intuitively anticipated benefit may be comparatively small for the primary target group. This difference regarding the anticipated benefits of participating in a counseling intervention with respect to students in need of extra support may cause students, teachers, and other groups of persons to adopt a one-sided, biased view of who is the target group for the intervention, with students in need of extra support possibly being perceived as less targeted by the program than students not in need of extra support.

Given the risk of people adopting a biased view of the target group with respect to students in need of extra support, we expect to see an unfavorable participation pattern in counseling programs promoting college access. Specifically, we expect students in high need of extra support to be less likely to participate in such interventions than students needing less extra support. As both teachers and students may have a biased view of the target group, we expect both selection by others (teachers) and self-selection to contribute to an unfavorable participation pattern.

# 3. Research Design

## 3.1 Intervention

To test our expectations regarding an unfavorable participation pattern in individual programs promoting college attendance, we use the example of a counseling intervention implemented in the German state of North Rhine-Westphalia.

The program we studied is very similar to the kind of guidance counseling typically found at U.S. high schools (Gysbers, 2005). Starting in the first year of the two-year cycle of upper secondary school[1], students receive one-on-one counseling on their post-high school educational and career options from trained counselors with a college degree. The counselors are staff members at higher education institutions located in geographic proximity to the high schools and regularly meet with the participating students for counseling sessions on school premises. Participation is voluntary and not a prescribed part of the curriculum. Aside from the individual counseling sessions, the program involves meetings with other program participants and with professionals working in the careers that students intend to pursue, as well as university visits and participation in additional events. The counselors employ a range of information, counseling, and support tools to prepare students

1 Secondary schools are highly stratified in Germany. Whereas vocational tracks (i.e., *Realschule, Hauptschule*) end before upper secondary school and therefore do not lead to the Abitur, the academic track at *Gymnasium* and at comprehensive schools (i.e., *Gesamtschule*) continues through upper secondary education, with most students enrolled in these tracks acquiring the Abitur. Furthermore, students enrolled at *Berufskollegs*, which prepare students for vocational training, can also acquire the Abitur under certain conditions. The program studied here generally offers guidance in the upper secondary academic tracks in Gymnasien and Gesamtschulen and in Berufskollegs.

for their post-high school education and to assist them with their career planning. Under standard conditions, students are either nominated for participation by their teachers (selection by others) or they may choose to participate on their own initiative (self-selection). In our research design, we introduce a minor deviation from this access policy (see below). With 17 universities designing and operating the program and more than 150 participating high schools, the intervention is widely present in North Rhine-Westphalia and one of the largest programs to promote higher education access in all of Germany.

The primary goal of the counseling activities is to encourage students who would otherwise not continue their education at a college to decide in favor of a college career. The secondary goal is to also optimize the college careers of students who already expect to enroll in higher education (choice of major, choice of institution, scholarship, etc.). Given the strong disparities in higher education access by educational background, students whose parents do not have a college degree are a special focus in this program.

## 3.2 Data

To perform our analysis, we use data gathered as part of the study *Future and Career Plans Before High School Graduation* (Pietrzyk et al., 2019), a randomized controlled trial to evaluate the educational intervention described above. To analyze participation behavior, we look at whether students who were randomly and individually assigned to the treatment condition actually participated in the program and whether this depends on their need for extra support. In doing so, we distinguish between self-selection and selection by others.

The study is hosted by 31 schools (Gymnasien and Gesamtschule) in North Rhine-Westphalia. At time point $t_0$ (February 2018), the first survey of students was implemented at schools that had agreed to participate in the study. Individual participation in the survey was voluntary for students. At this time point $t_0$, students were enrolled in the first year of the two-year cycle of upper secondary school. The $t_0$ data contain information on students' need for extra support prior to program participation. After being surveyed at $t_0$, students were individually and randomly assigned to a treatment condition involving program participation ($n = 702$) and a control group without treatment ($n = 702$). The counseling intervention started a few months after the first survey had taken place (May 2018). Teachers were given an important role in regulating participation, as they were asked to invite students in the treatment condition to sign up for the program. For this purpose, they received a list of names compiled by a survey institute on behalf of the research team. A few months after program start, students were surveyed again at time point $t_1$ (February 2019; $n = 590$ for the treatment condition; $n = 572$ for the control condition, as a result of one school and individual students dropping out of the survey). At this time point $t_1$, students were enrolled in the second year of the two-year cycle of upper secondary school. In the $t_1$ data, students reported whether they participat-

ed in the program and whether they had been invited by their teachers.[2] Because of missing values on the variables measuring need for extra support, the analysis sample consists of $n = 528$ students in the treatment condition.

## 3.3 Operationalization

### 3.3.1 Participation

The key dependent variable is whether students who were assigned to the treatment condition ($n = 528$) reported having actually participated in the counseling intervention. In the treatment group, $n = 127$ students, and hence 24 percent of the treatment group, reported not having participated.

### 3.3.2 Self-Selection and Selection by Others

In our analysis, we distinguish between non-participation as a result of self-selection and non-participation as a result of selection by others. Self-selection and selection by others are operationalized based on students' reports. Selection by others occurs if students in the treatment group who did not participate in the program report not having been invited to do so by the teachers. Self-selection occurs if students in the treatment group who did not participate in the program report having been invited to do so by the teachers.[3] Self-selection and selection by others are equally distributed in our sample. Self-selection occurred for $n = 64$ of all cases and hence for about 50 percent of non-participants. Selection by others was the case for $n = 63$ students and hence for about 50 percent of non-participants as well.

The independent variables encompass students' need for extra support. Since students' college-going intentions and academic achievement are strongly correlat-

2 We checked whether panel attrition from $t_0$ to $t_1$ may bias our results. Panel mortality from $t_0$ to $t_1$ slightly depends on the characteristics of need for extra support. The probability of dropping out from the study rises with lower levels of college-going intention $t_0$ and lower levels of academic achievement $t_0$ (see Appendix, Table A1). Since participants in high need of extra support completed the follow-up survey slightly less often, the mortality pattern might lead to a slight underestimation of an unfavorable pattern of program participation in regard to need for extra support, *if* non-participation in the follow-up survey were related not only to need for extra support, but also to non-participation in the program. Given the mortality pattern, we think it is unlikely that panel attrition results in an overestimation of an unfavorable pattern of participation with respect to need for extra support. Regarding item non-response, there are no missing values on the dependent variable, as participation in the program was an obligatory question in the $t_1$ survey.

3 As we cannot rule out the possibility that, given the time difference between program start and survey point $t_1$, some students at $t_1$ could not remember whether or not they were invited by their teachers, our operationalization of selection by others may lead to a slight overestimation of selection by others compared to self-selection.

ed[4], we operationalize these characteristics in two ways: separately and in combination as college readiness. This combined measurement allows us to display the joint effect of college-going intentions and academic achievement on program participation in a clear and informative manner.

### 3.3.3 College-Going Intention

Respondents were asked to rate the likelihood of their enrollment in college after earning their Abitur diploma on a 5-point Likert scale with verbal anchors. Verbal anchors ranged from *very likely* to *very unlikely*. In our analysis, we use this variable in four categorical levels to capture differences between groups of students in need of extra support. Given the positively skewed distribution, we combine the two lowest levels into one (low college-going intention: 17 %; medium college-going intention: 20 %; high college-going intention: 34 %; very high college-going intention: 29 %). This categorical operationalization allows for a straightforward contrast between students with low college-going intentions and students that intend to go to college.[5]

### 3.3.4 Academic Achievement

The average grade from seven subjects (German, mathematics, English, biology, physics, history, and social sciences) is used to measure academic achievement. Again, we use the variable in categorical levels to show differences between groups (satisfactory achievement: 47 %; good achievement: 42 %; very good achievement: 11 %). Again, this categorical operationalization allows for a straightforward contrast between rather low-achieving students and students who do not achieve low.[6]

### 3.3.5 College Readiness (Combination of College-Going Intention and Academic Achievement)

We combine the variables college-going intention and academic achievement. The group low college readiness includes students with satisfactory grades and low college-going intentions (13 %). The group medium college readiness includes students with good grades and medium college-going intentions or with a combination of very good grades and low college-going intentions or satisfactory grades and at least high college-going intentions (77 %). The group high college readiness includes stu-

4 Correlations between college-going intentions, academic achievement, and academic background are given in the Appendix (Table A2).
5 However, we also run analyses with the independent variable college-going intention measured on the original interval scale (5-point Likert scale) as robustness checks.
6 Again, we also run analyses with the independent variable academic achievement measured on the original interval scale (15-point scale) as robustness checks.

dents with very good grades and at least high college-going intentions (10 %). Again, this categorical operationalization allows for a straightforward contrast between students with low college readiness and their peers who have higher levels of college readiness.

### 3.3.6 Educational Background

If students have at least one parent with a college degree, they are assumed to have a high educational background (45 %); otherwise, a low educational background is assumed (55 %).

## 4. Results

In the following, we examine whether students with a high need for extra support participate less often in the individual college counseling intervention studied here than students with a low need for extra support. In this analysis, we not only study general differences in participation behavior by need of extra support, but we also distinguish whether these differences result from self-selection or selection by others.

We compute separate models for each characteristic of need for extra support, using the respective characteristic as the independent variable and students' membership in different groups of participants and non-participants as the dependent variable. First, we contrast the group of students who did participate in the educational program ($n = 401$) with the total group of students who did not participate in the intervention ($n = 127$). This gives us a total estimation of the unfavorable participation pattern regardless of whether it is caused by selection by others or by self-selection. Second, we compare the group of participants with the group of those who did not participate because of selection by others ($n = 64$) and those who did not participate because of self-selection ($n = 63$). For each comparison of groups, we calculate linear probability models with the aforementioned groups as dependent variables and the characteristics of need for extra support as independent variables. Finally, we run a multinomial multivariate model, in which all predictors (college-going intention, academic achievement, and educational background) are considered simultaneously. To control for school effects, we use cluster-robust standard errors in all models. We begin by analyzing differences in participation by students' college-going intention. The results are shown in Table 1.

The results regarding the influence of college-going intention on participation show that, as expected, students with higher college-going intentions participate in the program much more often than students with low college-going intentions. A look at the total results reveals that the extreme group of students with low college-going intentions joined the program much less often than all comparison groups with higher college-going intentions, with the difference in participation growing

almost continuously as differences in college-going intentions increase. As expected, the largest difference in participation – estimated at roughly 23 percentage points ($p < .001$) – is found when comparing the extreme group with low college-going intentions and the extreme group with high college-going intentions. The distinction between selection by others and self-selection shows that the aforementioned differences in participation probabilities result from both unfavorable selection by others and unfavorable self-selection. In the respective models, as in the total model, participation probability increases almost continuously across all categories along with growing college-going intentions, reaching statistical significance for the comparison of the extreme groups (for selection by others: 18 percentage points difference, $p = .002$; for self-selection: 12 percentage points difference, $p = .016$). It seems that selection by others is stronger than self-selection in relation to college-going intention, as the relevant coefficients for selection by others appear to be consistently higher than those for self-selection. However, a comparison of coefficients does not yield statistically significant results.[7]

Table 1: Difference in Participation by College-Going Intention

| | Total | | Selection by others | | Self-selection | |
|---|---|---|---|---|---|---|
| | Coefficient (*SE*) | *p* | Coefficient (*SE*) | *p* | Coefficient (*SE*) | *p* |
| College-going intention Ref. low | | | | | | |
| Medium | .13 | .040 | .10 | .086 | .08 | .105 |
| | (.07) | | (.07) | | (.06) | |
| High | .15 | .026 | .13 | .038 | .07 | .094 |
| | (.07) | | (.07) | | (.05) | |
| Very high | .23 | < .001 | .18 | .002 | .12 | .016 |
| | (.06) | | (.06) | | (.06) | |
| Constant | .62 | < .001 | .74 | < .001 | .79 | < .001 |
| | (.05) | | (.05) | | (.05) | |
| Observations | 528 | | 465 | | 464 | |
| $R^2$ | .030 | | .030 | | .014 | |

*Note*. Study groups: Participation in the program ($n = 401$) vs. non-participation in the program ($n = 127$) for the total model or non-participation because of selection by others ($n = 64$) or non-participation because of self-selection ($n = 63$), respectively; results of linear probability models with cluster-robust standard errors at the high school level; dependent variable: participation vs. non-participation; one-sided test. Source: *Future and Career Plans Before High School Graduation* (ZuBAb Study), own calculations.

Next, we analyze differences in participation with respect to students' academic achievement. The results are shown in Table 2.

7 The analyses illustrate categorical differences between the groups with different levels of college-going intention. Additional analyses using college-going intention as an interval-scaled variable likewise confirm the influence of college-going intention on participation probability in the expected direction (see Appendix, Table A3).

Table 2: Difference in Participation by Academic Achievement

| | Total | | Selection by others | | Self-selection | |
|---|---|---|---|---|---|---|
| | Coefficient (*SE*) | *p* | Coefficient (*SE*) | *p* | Coefficient (*SE*) | *p* |
| Academic achievement Ref. satisfactory | | | | | | |
| Good | .09 | .008 | .10 | .009 | .02 | .233 |
| | (.04) | | (.04) | | (.03) | |
| Very good | .18 | < .001 | .14 | .003 | .08 | .029 |
| | (.05) | | (.05) | | (.04) | |
| Constant | .70 | < .001 | .81 | < .001 | .85 | < .001 |
| | (.04) | | (.05) | | (.03) | |
| Observations | 528 | | 465 | | 464 | |
| $R^2$ | .020 | | .025 | | .005 | |

*Note*. Study groups: Participation in the program ($n = 401$) vs. non-participation in the program ($n = 127$) for the total model or non-participation because of selection by others ($n = 64$) or non-participation because of self-selection ($n = 63$), respectively; results of linear probability models with cluster-robust standard errors at the high school level; dependent variable: participation vs. non-participation; one-sided test. Source: *Future and Career Plans Before High School Graduation* (ZuBAb Study), own calculations.

The results show that sharp differences in participation probability in the expected direction also emerge by academic achievement. As students' academic achievement increases, they are much more likely to participate in the educational intervention. According to the total results, students with satisfactory grades are much less likely to sign up for the program than students with good or very good grades. A comparison of the extreme groups of students with satisfactory und very good grades yields a difference of 18 percentage points ($p < .001$), which must be considered a substantial difference. As with participation differences by college-going intention, unfavorable selection by others and unfavorable self-selection contribute to this unfavorable participation pattern in relation to academic achievement with coefficients in the respective models pointing in the expected direction. And as with the results on college-going intentions, selection by others seems to play a somewhat bigger role in relation to academic achievement than self-selection with coefficients in the selection by others model appearing to be higher than in the self-selection model. Again, however, there is no statistically significant evidence to confirm this difference between the influence of academic achievement on participation probability based on selection by others and on participation probability based on self-selection.[8]

As the characteristics of college-going intentions and academic achievement are strongly interconnected, we go on by testing the influence of the combined characteristic of college readiness on the probability of participating in the intervention. Doing so allows us to assess the combined effect of both characteristics. The results are shown in Table 3.

8 Again, the analyses show categorical differences between groups with different levels of academic achievement. The main findings are also confirmed if academic achievement is used as an interval-scaled variable (see Appendix, Table A4).

Table 3: Difference in Participation by the Combined Characteristic College Readiness

| | Total | | Selection by others | | Self-selection | |
|---|---|---|---|---|---|---|
| | Coefficient (*SE*) | *p* | Coefficient (*SE*) | *p* | Coefficient (*SE*) | *p* |
| College readiness Ref. low | | | | | | |
| Medium | .23 | .002 | .19 | .006 | .13 | .026 |
| | (.07) | | (.07) | | (.07) | |
| High | .32 | < .001 | .25 | < .001 | .18 | .006 |
| | (.07) | | (.06) | | (.07) | |
| Constant | .55 | < .001 | .69 | < .001 | .74 | < .001 |
| | (.06) | | (.06) | | (.07) | |
| Observations | 528 | | 465 | | 464 | |
| $R^2$ | .038 | | .038 | | .018 | |

*Note*. Study groups: Participation in the program ($n = 401$) vs. non-participation in the program ($n = 127$) in the total model or non-participation because of selection by others ($n = 64$) or non-participation because of self-selection ($n = 63$), respectively; results of linear probability models with cluster-robust standard errors at the high school level; dependent variable: participation vs. non-participation; one-sided test. Source: *Future and Career Plans Before High School Graduation* (ZuBAb Study), own calculations.

The results generally show that college readiness does influence participation probability. This was to be expected, given the previous results on college-going intention and academic achievement. However, the results on college readiness add breadth to the previous analyses by demonstrating that college-going intention and academic achievement, in combination, have a distinct influence on students' likelihood of participating in the program. First, the models on college readiness (Table 3) consistently yield a significant influence of college readiness on all levels for all three models, which was not consistently the case in the models for the individual characteristics (see Table 1 and Table 2). Second, coefficients in the models on college readiness (Table 3) appear to be consistently higher than the coefficients for each of the two single variables (see Table 1 and Table 2). However, the differences in predictive power turn out not to be consistently significant.[9]

Specifically, the college readiness model estimates the total participation gap between the extreme category low college readiness and the category high college readiness at 32 percentage points, which must be considered a substantial difference ($p < .001$). But the gap between the extreme category and the medium category of college readiness is quite high as well (23 percentage points difference, $p = .002$). As with the other variables, selection by others seems to be stronger than self-selection with respect to college readiness – a result that was to be expected given

9 It is only in the total model and in the selection by others model that the prediction for college readiness at the most extreme level is significantly higher than that for academic achievement at the most extreme level ($\chi^2 = 7.36$, $p = .007$, and $\chi^2 = 4.80$, $p = .029$, respectively).

the previous findings. Again, however, the comparison between the coefficients does not yield a statistically significant result.

In the next step, we test whether an unfavorable participation pattern exists with respect to educational background. The results are shown in Table 4.

The results clearly show that, contrary to our expectations, educational background does not factor into students' participation in the program, as none of the models suggests an effect of educational background on participation probability.

Table 4: Difference in Participation by Educational Background

| | Total | | Selection by others | | Self-selection | |
|---|---|---|---|---|---|---|
| | Coefficient (*SE*) | *p* | Coefficient (*SE*) | *p* | Coefficient (*SE*) | *p* |
| Educational background Ref. low | | | | | | |
| High | –.00 | .482 | –.04 | .151 | .04 | .071 |
| | (.04) | | (.04) | | (.03) | |
| Constant | .76 | < .001 | .88 | < .001 | .85 | < .001 |
| | (.03) | | (.03) | | (.02) | |
| Observations | 528 | | 465 | | 464 | |
| $R^2$ | .000 | | .003 | | .003 | |

*Note*. Study groups: Participation in the program ($n = 401$) vs. non-participation in the program ($n = 127$) for the total model or non-participation because of selection by others ($n = 64$) or non-participation because of self-selection ($n = 63$), respectively; results of linear probability models with cluster-robust standard errors at the high school level; dependent variable: participation vs. non-participation; one-sided test. Source: *Future and Career Plans Before High School Graduation* (ZuBAb Study), own calculations.

Finally, we run a multinomial multivariate regression, in which all predictors (college-going intention, academic achievement, and educational background) are considered simultaneously and in which the outcome is defined as program participation (base) compared to the category in which the student has not participated based on selection by others and in which the student has not participated based on self-selection. The multivariate model informs about how each predictor impacts non-participation due to selection by others and due to self-selection when the other predictors are held constant.

The results show that the impact of college-going intention and academic achievement on non-participation in the multivariate model is lower than in the above presented univariate models (see Table 5). Specifically, the coefficients of these predictors are constantly lower in the multivariate model than it is the case in the univariate models. Only the differences between the rather extreme categories of low and very high college-going intention and of satisfactory and very good academic achievement turn out to be statistically significant (for selection by others). The pattern of lower coefficients in the multivariate model could be expected against the background of strong correlations between college-going intention and academic achievement (see Appendix, Table A2).

Table 5: Multinomial Multivariate Prediction of Non-Participation

| | Non-participation based on selection by others | | | | Non-participation based on self-selection | | | |
|---|---|---|---|---|---|---|---|---|
| | Coefficient (*SE*) | *p* | AMEs (*SE*) | *p* | Coefficient (*SE*) | *p* | AMEs (*SE*) | *p* |
| College-going intention Ref. low | | | | | | | | |
| Medium | –.56 (.45) | .107 | –.06 (.06) | .159 | –.60 (.47) | .099 | –.06 (.06) | .151 |
| High | –.75 (.57) | .094 | –.08 (.07) | .103 | –.42 (.33) | .097 | –.04 (.04) | .184 |
| Very high | –1.12 (.52) | .016 | –.11 (.06) | .024 | –.87 (.47) | .032 | –.08 (.05) | .080 |
| Academic achievement Ref. satisfactory | | | | | | | | |
| Good | –.59 (.35) | .045 | –.06 (.04) | .067 | .01 (.27) | .491 | .01 (.03) | .367 |
| Very good | –1.11 (.54) | .020 | –.09 (.05) | .020 | –.53 (.62) | .195 | –.04 (.05) | .235 |
| Educational background Ref. low | | | | | | | | |
| High | .54 (.26) | .018 | .06 (.03) | .030 | –.23 (.24) | .165 | –.03 (.02) | .092 |
| Constant | –1.15 (.29) | < .001 | | | –1.21 (.32) | < .001 | | |
| Pseudo $R^2$ | .037 | | | | | | | |

*Note*. Participation in the program (base) vs. non-participation based on selection by others and, respectively, non-participation based on self-selection ($N = 528$), model with cluster-robust standard errors at the high school level; one-sided test. AMEs = Average Marginal Effects; this parameter indicates how many percentage points the probability of non-participation (based on selection by others or self-selection) increases when the independent variable increases by one category. Source: *Future and Career Plans Before High School Graduation* (ZuBAb Study), own calculations.

However, we observe an interesting finding regarding educational background. More specifically, educational background significantly affects non-participation if additional predictors are controlled for. Contrary to our expectation, non-participation based on selection by others is *higher* for students with high educational background than for students with low educational background (6 percentage points difference; $p = .030$). This finding indicates that teachers invited students of high educational background *less* frequently to the program than their equally aspiring and equally performing peers of low educational background. Non-participation based on self-section, however, is not significantly affected by educational background (–3 percentage points difference; $p = .092$).

## 5. Discussion

As educational interventions become increasingly important to people's educational outcomes throughout Europe, the present study aimed to substantially expand the state of research on participation patterns in individual educational interventions promoting college attendance with participation being voluntary. Given the risk of a one-sided bias in the way students, teachers, and other persons perceive the intended target group of an intervention, we expected students in need of extra support to be much less likely to participate in such programs than students not in need of extra support. In our analysis, we identified various dimensions of need for extra support, which we were able to consider separately. Moreover, we were able to distinguish whether an unfavorable participation pattern is driven primarily by students' self-selection or by selection by others, namely their teachers.

Our results show that an unfavorable participation pattern in relation to students needing extra support does emerge in the individual college counseling intervention studied here. Specifically, high school students with low college-going intentions and low academic achievement are underrepresented in the program we looked at. With a participation gap of up to 32 percentage points between students in need and not in need of extra support, the difference turns out to be substantial. This unfavorable participation pattern results from both an unfavorable selection by the teachers and an unfavorable self-selection by the students. Overall, selection by teachers according to the various dimensions of need for extra support seems to be stronger than self-selection by the students, even though this difference could not be shown to be statistically significant. Contrary to our expectations, no participation differences emerged by students' educational background when we did not control for further characteristics. However, when controlling for college-going intentions and academic achievement, educational background affects participation. More specifically, teachers invited students of high educational background *less* frequently to the program than their equally aspiring and equally performing peers of low educational background. Our results are thus largely in line with the broad existing research on unfavorable participation patterns by need for extra support in other types of programs, namely interventions to promote health behavior changes and interventions to facilitate labor market entry (e.g., Ahmed et al., 2010; Heckman & Smith, 2004; Hoeck et al., 2014; Noguchi et al., 2007; Palència et al., 2010; Veugelers & Yip, 2003; Zackrisson et al., 2003). However, we also observe teachers to be attentive to students' educational background in interaction with their college readiness.

We suspect that the participation gap we found with respect to students' college-going intentions and academic achievement is largely the result of one-sided bias in the way students, teachers, and other persons perceive the intended target group of the intervention (cf. Heckman & Smith, 2004). Like numerous other interventions of this kind (Barone et al., 2017; Barr & Castleman, 2017; Bonilla et al, 2017; Bos et al., 2012; Carrell & Sacerdote, 2013; Castleman et al., 2014; Ford et al., 2014; Hast-

ings et al., 2015; Myers et al., 2004), the college counseling program we studied pursues multiple goals, which are hierarchically structured. Our results suggest that the primary target group – students in need of extra support, who are to receive assistance with enrolling in higher education (primary goal) – is systematically perceived as being less targeted by the program than the secondary target group, that is, students not in need of extra support, who are likely to pursue higher education regardless of their participation in the program and whose college career is to be optimized by participating in the intervention (secondary goal). Our assumption that it is people's perception of the target group that largely accounts for the participation gap we found is supported by the following fact: In addition to the primary and secondary target group, the program we studied also explicitly targets students from non-academic families – a fact that is presumably communicated very clearly by school officials in charge of the program. This kind of target group communication might explain why non-academic background – one of the characteristics used to define need for extra support – turned out not to have an influence on processes of self-selection and selection by others in our study if studied in a univariate model, whereas a U.S. study did find an unfavorable composition of participants in an individual program based on the number of books in students' households (McGuigan et al., 2016, pp. 497–498). We even observe that students with non-academic background are more frequently invited by teachers to participate in the program if other background characteristics are considered. This finding suggests that wide communication of the target group in the school setting has a positive impact on participation patterns.

What follows from these thoughts on biased target group perception is that the primary target group should be communicated broadly when implementing programs promoting college access to prevent the emergence of unfavorable participation patterns by need for extra support. As teachers are systematically less likely to invite students in high need of extra support to participate in such programs, and as students in high need of support are themselves systematically less likely to participate, teachers should be provided with information regarding the primary target group of a given program, and stronger efforts should be made to motivate students in the primary target group to sign up. Additionally, it might make sense to regulate access to the program for the secondary target group to counteract their overrepresentation. There are several reasons why such modifications in the practice of educational programs promoting college access are advisable.

The unfavorable participation gap with respect to students' need for extra support of up to 32 percent that we have found may be even more pronounced under real program conditions. After all, our research design deviated from standard program conditions with respect to selection by others, as teachers were given a list of students to invite. It seems reasonable to expect that teachers, when free to decide which students to invite, are likely to bypass the primary target group even more because of their biased perception of whom this program is for. With regard to self-selection, it is important to keep in mind that our investigated group consisted ex-

clusively of students who were willing to participate in the trial. It is reasonable to assume, however, that students in need of extra support, more than other students, chose not to participate in our survey in the first place. As a consequence, self-selection and selection by others based on the need for extra support might be higher under real-world conditions than under the artificial conditions created for our research design. Should the participation gap in fact turn out to be higher under real conditions than the gap we found in our study, the following thoughts on the problematic consequences of unequal participation rates would be even more applicable.

First, a program designed to promote college access in which students in need of extra support are underrepresented runs the risk of making suboptimal use of resources. With respect to the primary goal of raising college enrollment rates, the intervention can generally be expected to have a lower impact if students not in need of extra support are systematically overrepresented. Given that this group is likely to pursue higher education even if students do not participate in the program, their college enrollment rate is not raised as a result of the program, meaning that the program's general effect on college enrollment is lower. We are currently investigating whether and how the studied program influences the postsecondary educational pathways of young adults.

Second, many programs promoting college access are conceived as a tool for reducing educational inequalities between secondary school students. Theoretically speaking, the inequality-reducing effect of interventions depends on the types of students who participate in the intervention and on the extent to which the participating groups of persons actually benefit from the program in terms of their educational outcomes (Pietrzyk & Erdmann, 2020). Even if educational programs have generally been shown to have a participation effect for the primary target group in terms of their college enrollment (e.g., Barr & Castleman, 2017; Bonilla et al., 2017; Castleman et al., 2014; Ford et al., 2014; Hasting et al., 2015; Kerr et al., 2015; McGuigan et al., 2016; Myers et al., 2004), educational inequalities between groups in need and not in need of extra support may still be reinforced if these groups are unequally represented in the program and if the group not in need of extra support also benefits from the program in terms of enhancing their college career. Research findings suggest that educational programs do in fact have a positive effect on enhancing college careers (Barone et al., 2017; Barr & Castleman, 2017; Bonilla et al., 2017; Bos et al., 2012; Carrell & Sacerdote, 2013; Castleman et al., 2014; Ford et al., 2014; Hastings et al., 2015; Myers et al., 2004), not only on college-going rates.

In a scenario where the group in need of extra support is underrepresented and the group not in need of extra support benefits from their participation in terms of enhancing their college careers, educational inequalities between these groups might be exacerbated. The group in need of extra support, given its underrepresentation in the program, would benefit to a relatively small degree from the growing availability of college counseling programs, whereas the group not in need of extra support would benefit to a relatively large degree from the existence of such programs because of its strong presence therein. In other words, students showing a

low level of college readiness when the program is introduced would see relatively small benefits from the existence of college counseling interventions, whereas students showing a high level of college readiness would pull even further ahead of their less college-ready classmates. As a result, the programs would serve to reinforce educational disparities. Contrary to their goal of promoting more equality in educational trajectories, the programs would be most beneficial to those who can already expect strong educational outcomes regardless of their participation in the program.

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# Appendix

Table A1: Panel Mortality Between $t_0$ and $t_1$ by Characteristic of Need for Extra Support

| | $t_0$ | $t_1$ | Difference $t_0$ and $t_1$ *p* |
|---|---|---|---|
| College-going intention | | | |
| *M* | 3.63 | 3.67 | .019 |
| *SD* | (1.21) | (1.20) | |
| *n* | 646 | 568 | |
| Academic achievement | | | |
| *M* | 9.07 | 9.19 | < .001 |
| *SD* | (2.25) | (2.23) | |
| *N* | 625 | 556 | |
| Educational background | | | |
| No academic background (%) | 55 | 55 | |
| Academic background (%) | 45 | 45 | |
| *N* | 582 | 580 | |

*Note*. The table reports mean values (standard deviations) or percentages of all respondents in the investigated group (i.e., randomized assignment to the treatment condition) with valid data on characteristics of need for extra support at survey points $t_0$ and $t_1$, respectively.
Operationalizations: College-going intention: 5-point measurement of realistic college aspiration; academic achievement: 15-point measurement of average grades in seven subjects; educational background: dichotomous measurement whether at least one parent has a college degree.
Test for significant differences: *t* test including significant differences in college-going intentions and in academic achievement between panel mortality groups (0 = participation only at $t_0$; 1 = participation at $t_0$ and $t_1$) resp. $\chi^2$ test for educational background and panel mortality groups (0 = participation only at $t_0$; 1 = participation at $t_0$ and $t_1$), two-sided test. Source: *Future and Career Plans Before High School Graduation* (ZuBAb Study), own calculations.

Table A2: Correlations Between Independent Variables

| | College-going intention | | Academic achievement | |
|---|---|---|---|---|
| | *r* | *p* | *r* | *p* |
| Academic achievement | .48 | < .001 | | |
| Academic background | .15 | < .001 | .15 | < .001 |

*Note*. College-going intention measured on a 5-point Likert scale; academic achievement measured as grade point average of seven school subjects; academic background measured by whether the respondent has at least one parent who graduated from higher education; only individuals of the analytical sample are considered; $N = 528$; two-sided test. Source: *Future and Career Plans Before High School Graduation* (ZuBAb Study), own calculations.

Table A3: Differences in Participation by College-Going Intention

| | Total | | Selection by others | | Self-selection | |
|---|---|---|---|---|---|---|
| | β (*SE*) | *p* | β (*SE*) | *p* | β (*SE*) | *p* |
| College-going intention | .06 | < .001 | .05 | .003 | .03 | .015 |
| | (.02) | | (.02) | | (.01) | |
| Constant | .54 | < .001 | .68 | < .001 | .75 | < .001 |
| | (.07) | | (.07) | | (.06) | |
| Observations | 528 | | 465 | | 464 | |
| $R^2$ | .029 | | .030 | | .012 | |

*Note*. Study groups: Participation in the program ($n = 401$) vs. non-participation in the program ($n = 127$) in the total model or non-participation because of selection by others ($n = 64$) or non-participation because of self-selection ($n = 63$), respectively; results of linear probability models with cluster-robust standard errors at the high school level; dependent variable: participation vs. non-participation; non-standardized beta coefficients; college-going intention is measured on the original 5-point Likert scale; one-sided test. Source: *Future and Career Plans Before High School Graduation* (ZuBAb Study), own calculations.

Table A4: Differences in Participation by Academic Achievement

| | Total | | Selection by others | | Self-selection | |
|---|---|---|---|---|---|---|
| | β (*SE*) | *p* | β (*SE*) | *p* | β (*SE*) | *p* |
| Academic achievement | .03 | < .001 | .03 | < .001 | .01 | .090 |
| | (.01) | | (.01) | | (.01) | |
| Constant | .48 | < .001 | .60 | < .001 | .76 | < .001 |
| | (.09) | | (.09) | | (.08) | |
| Observations | 528 | | 465 | | 464 | |
| $R^2$ | .024 | | .032 | | .005 | |

*Note*. Study groups: Participation in the program ($n = 401$) vs. non-participation in the program ($n = 127$) in the total model or non-participation because of selection by others ($n = 64$) or non-participation because of self-selection ($n = 63$), respectively; results of linear probability models with cluster-robust standard errors at the high school level; dependent variable: participation vs. non-participation; non-standardized beta coefficients; academic achievement is measured on the original 15-point scale; one-sided test. Source: *Future and Career Plans Before High School Graduation* (ZuBAb Study), own calculations.