Student Dyad Formation and Performance:
Do Socioeconomic and Migration Status Matter?

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Abstract

In an empirical study involving undergraduates, we find that students with migration backgrounds tend to underperform and keep among themselves. Evidence on socioeconomic status is mixed: While parental education helps student performance, income has no impact. The results call on universities and the students themselves to actively integrate foreign students, whereas segregation by socioeconomic status is less of a concern.

Bildung und Leistung studentischer Dyaden:
die Rolle von Migrationsstatus und sozialem Hintergrund

Zusammenfassung

In einer empirischen Studie mit Studierenden zeigen wir, dass jene mit Migrationshintergrund geringere Leistungen erzielen und tendenziell unter sich bleiben. Bezüglich des sozialen Hintergrunds sind die Ergebnisse gemischt: Während elterliche Bildung mit höheren Studierendenleistungen korreliert, hat das Einkommen keinen Einfluss. Die Ergebnisse mahnen zur aktiven Integration von Studierenden mit Migrationshintergrund. Hingegen besteht weniger Anlass zur Sorge vor Segregation nach sozialer Herkunft.

Formation et performance des équipes de deux étudiants :
statut migratoire et milieu social

Résumé

Dans une expérience menée auprès d'étudiants, nous montrons que ceux issus de l'immigration obtiennent des résultats plus faibles et ont tendance à rester entre eux. Les résultats sur le statut socio-économique sont mitigés : si l'éducation des parents soutient les performances de leurs enfants, leur revenu n'a aucune influence. Les résultats appellent à une intégration active des étudiants issus de l'immigration, alors que la ségrégation par classe sociale est moins préoccupante.

1 Introduction

1.1 Background and Motivation

Student bodies at higher education institutions in Germany and elsewhere are growing increasingly diverse and international (Kroher et al., 2023). This raises several concerns. Firstly, since increasing diversity within the student body can entail diverging performance levels (Schmucker & Häseler, 2016, 2017), it is becoming more difficult to offer teaching styles and contents that do justice to the needs of most students (Krüger-Basener et al., 2013; Wielepp, 2013). We focus in particular on two socio-demographic dimensions. Firstly, the European refugee crisis has added considerable interest regarding *migration background*, which can have a significant impact on student performance (Schmucker & Häseler, 2016, 2017). Secondly, concerning *socioeconomic status* (SES), we are motivated by the debate on (un)equal opportunities in education. Working-class children have always been at a disadvantage when it comes to educational achievement, as reflected by their low admission rates to higher education (Dahrendorf, 1965). This discrepancy still persists today: Admission rates to higher education are 27% versus 79% for children from non-academic and academic families, respectively (Stifterverband, 2022). Having access to higher education is one thing for students from disadvantaged families, but doing well in their studies is another matter. While research abounds on the link between parental SES and child performance, much of it concerns the transition between high school and university (e.g. Wintre et al., 2011), or even earlier life stages (e.g. Halle et al., 1997; Corwyn, 2004; Davis-Kean, 2005), rather than academic performance *within* higher education. Furthermore, since the effect of parental SES on child performance is strongly shaped by cultural and political factors, it is difficult to generalise any findings beyond the country from which they were derived – a point which calls into question the value of meta-analyses on this issue, such as by Rodríguez-Hernández et al. (2020) or Tan (2024). In Germany, reducing the link between SES and performance in higher education is a stated policy objective (SPD et al., 2021). The present paper adds some evidence on the success of that policy.

A second concern that springs from increasing heterogeneity is the question as to how well students with minority backgrounds are integrated in class, i.e. whether there is a tendency for them to 'keep to themselves', that is, to engage in 'voluntary segregation'. We investigate whether any such effect is reflected in the way in which the students select a partner to form a dyad, i.e. a team of two, for a joint exercise. This particular team size was chosen because dyads are most commonly encountered in collaborative student tasks at university. Finally, we ask whether the heterogeneity of its members affects dyad performance. Both Schneid et al. (2014) and Horwitz and Horwitz (2007) find that diversity with respect to gender and age makes no difference to team performance. Other empirical studies on the interconnection between team diversity and performance include Wegge et al. (2008), as well as several meta-studies, such as Horwitz and Horwitz (2007) and Bell et al. (2011). However, most of this literature concerns the corporate rather than the higher education context. Our study aims to close this gap.

1.2 Research Strategy and Hypotheses

This paper reports the methodology and results of an empirical study with undergraduate management students at Hamburg University, which aims to expand on earlier research on

individual performance and the formation and performance of dyads. A special focus is on how these three types of outcomes are affected by the students' socio-demographic backgrounds, in particular their migration and socioeconomic status. The latter is proxied by parental educational attainment and by the students receiving a student loan, which is only available for those from below-average income households. Besides information on gender, age and native language, we also collect and analyse data on the students' engagement in voluntary work as a proxy for their commitment and work ethic (Schnell & Hoof, 2012) or, more generally, their incorporated cultural capital (Bourdieu, 1983; Iwen et al., 2022).

The three types of outcomes mentioned above correspond to three research questions. Two them can be further differentiated into two hypotheses each. The first research question (Q1) is: Does the students' individual performance with regard to a curriculum-related task depend on the set of socio-demographic indicators we measure? In terms of hypotheses, we expect (H1) higher performance for students from more affluent and well-educated families and (H2) lower performance for students with migration backgrounds. The connection between socio-demographic traits and individual student performance has been suggested in a range of prior work, including Schmucker and Häseler (2016), Erdel (2010) and Jirjahn (2007), which we expand on. Students from families with higher socio-economic standing are likely to perform better because their families' financial support allows them to devote more time to their studies (Kroher et al., 2023). Furthermore, well-educated parents with high income often wish for their offspring to attain at least the same social status, so the children are expected to excel in their studies (Davis-Kean, 2005). Halle et al. (1997) find that mothers with better education have higher expectations for their children's academic achievements, and that the children subsequently indeed meet these expectations. In addition, Corwyn (2004) finds maternal educational attainment to have a consistent impact on cognitive and behavioural outcomes of children. Given their parents' achievements, such students in turn tend to have more faith in their academic self-efficacy (Bandura, 1997; Eccles & Wigfield, 2002), i.e. they have internalised their parents' expectations regarding their performance (Buchmann & Kriesi, 2013; Mucha & Decker, 2017). Working-class students, by contrast, will often have greater difficulty adjusting to the academic environment (Bargel & Bargel, 2010).

Following the individual stage of our study, the students were grouped in dyads. Exactly half of them were assigned a team partner at random, whereas the other half were free to choose a partner of their liking (yielding the 'voluntary' dyads). Our second research question (Q2) is then whether the voluntary dyads differ systematically in their socio-demographic composition from those that would ensue if all students were paired randomly. Specifically, we ask whether voluntary dyads exhibit lower socio-demographic diversity. To support this research question, although dyads are often not considered teams and their dynamics may be quite different from larger groups (Moreland, 2010), we draw on the team literature because of its richer theoretical and empirical body of research. Byrne's (1971) 'law of attraction' suggests a tendency to team up with similar individuals, as similarity and familiarity are associated with trust and ease of communication. This expectation is confirmed empirically by Goins and Mannix (1999). The students can often assess a person's SES and migration background based on their diction and possibly their appearance. Therefore, even minimal interaction with a potential partner will enable them to discriminate according to these characteristics – if they are so inclined.

Once the dyads have formed, our third research question is whether a dyad's performance depends on its composition. Specifically, we expect that (H3) self-selected dyads

outperform randomly composed ones because the former are likely to exhibit greater familiarity among the members, which facilitates communication. In a setting not dissimilar to ours, Chapman et al. (2006) examine the performance differential between randomly and voluntarily assembled teams, but they do not focus on diversity as a potential transmission mechanism. Rienties et al. (2014) also investigate voluntary versus random dyads of students, but with respect to other outcome variables. Finally, we think that (H4) dyad performance benefits from socio-demographic homogeneity. There are two opposing theoretical arguments concerning H4. On the one hand, cognitive diversity within a team – the degree to which the members differ regarding their perspectives, expertise, and experiences (Miller et al., 1998) – is thought to enhance team performance because the unique cognitive attributes of the individual members promote creativity, innovation, and problem solving (Cox & Blake, 1991; Hambrick et al., 1996; McLeod & Lobel, 1992). On the other hand, social identity theory (Tajfel & Turner, 1986; Tziner, 1985) suggests a negative association between team diversity and performance: Homogeneous teams work together well because of their members' shared characteristics; similarity promotes team cohesion and thus performance. Rastetter (2006) provides a general overview of the theoretical challenges associated with diversity in teams.

The remainder of the paper is structured as follows: The next section explains the process of data collection, while Section 3 presents some descriptive statistics. Each of the subsections of Section 4 then presents our main findings regarding one of the research questions. Section 5 discusses the results in relation to prior research and to the expectations outlined above. Finally, Section 6 concludes with a summary and some suggestions for further research.

2 Data Collection

The data were collected among undergraduate students at the University of Hamburg using a mix of survey and experimental methods that has proven to be viable and reliable in a series of earlier studies (Schmucker, 2015; Häseler & Schmucker, 2015; Schmucker & Häseler, 2017, 2021). The research design is shaped first and foremost by its budget. Due to a lack of dedicated research funds, the study had to be conducted during regular lecture hours, using the facilities that were ordinarily available and involving the students enrolled in a single class. Amongst other resulting constraints, this limited the sample size, with important implications for the analysis. On the upside, these limitations make the study easily replicable.

The class "Human Resource Management" were told that in preparation for the next lecture, students should pair up in dyads for an exercise intended to consolidate their knowledge of the material taught so far and to provide the data basis for a piece of social science research with relevance to the course curriculum. The students' consent to our use of their data for the stated purpose follows from this announcement and the fact that lecture attendance is voluntary. On the day of the actual event, those students who indeed arrived in pairs ('voluntary dyads') were asked to choose a seat on one side of the lecture theatre, whereas those who arrived individually were arbitrarily grouped in dyads and asked to sit on the other side. Several 'voluntary dyads' were asked to relocate to the 'involuntary' side so as to achieve a balance of dyad types. The 'involuntary' dyads were then asked to exchange one member each with the neighbouring dyad on their side of the room, so that the resulting dyad composition on this side was at least somewhat random. Finally, all dyads were given a pair of clicker devices (Schmucker, 2015) from a classroom response system to communicate their answers to questions that were to be displayed on the lecture screen. For each dyad, we

noted the pair of serial numbers transmitted by the clickers, so we were later able to match the members' responses. Usable data were obtained for 92 students in 46 dyads, exactly half of which were of the 'voluntary' and of the 'random' type, respectively.

The exercise began with a set of ten questions relating to the material taught previously in the course (the 'performance instrument'). For each question, the students were to choose one of five answer choices individually, without consulting with their partner. The time allowed to read the questions and the answer options and to submit the response was 90 seconds per question. The number of correct responses out of the ten questions per student is our measure of individual performance. This instrument has been used extensively in prior related research (e.g. Häseler & Schmucker, 2015; Schmucker & Häseler, 2024), with consistent results: successive generations of students tend to achieve very similar results.

Next, each student was asked to answer eight questions regarding their socio-economic background. Then all dyads surrendered one of their two clickers, using only the remaining one for the rest of the exercise. The dyads were then asked to indicate whether they were of the 'voluntary' or of the 'random' type and how familiar the two members were with each other. Finally, the dyads were administered the performance instrument once again, though this time they were to submit a joint decision after consulting with each other (peer instruction). The resulting number of correct responses to the task is our indicator of dyad performance.

3 Data Set

Figure 1 shows the relative frequency of performance levels for the 92 individuals in the first round and for the 46 dyads in the second round. Despite the discrete nature of the variables, both distributions appear approximately normal – an important prerequisite for the application of standard statistical techniques below.
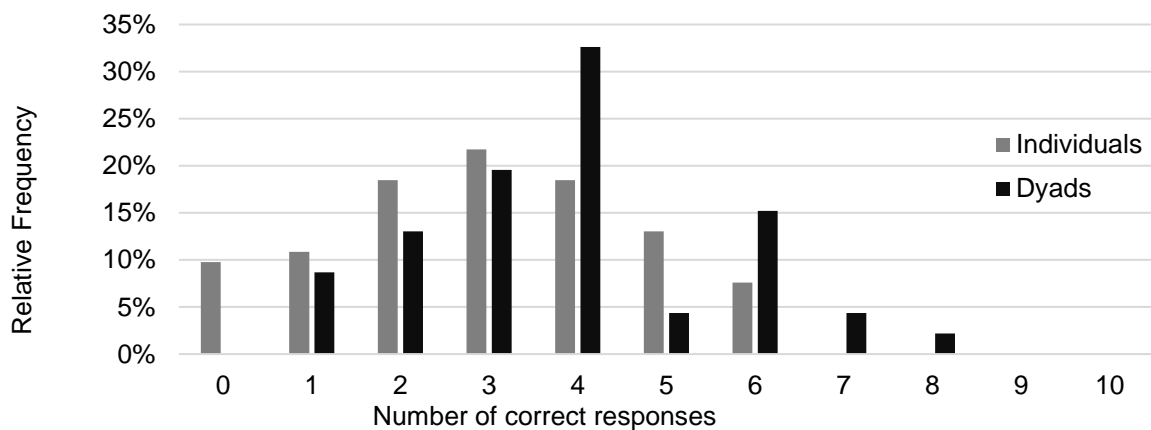

Figure 1: Relative frequency of correct responses for individual respondents and dyads

The dyads performed somewhat better than the individuals (averages of 3.84 versus 2.99 correct responses). This advantage will be due to a combination of teamwork effects on the one hand and learning effects on the other hand – even individuals would have done better in the second round, simply because of the extra opportunity and additional time to reconsider the answers. Which effect dominates is impossible to tell with the present research design. There is, however, some evidence of discussions (teamwork) actually taking place within the dyads: In 5 of the 46 cases, the dyad score was indeed below the lower one of the two individual scores, so there must have been some debate, though not for the better.

In 18 cases, the dyad score exceeded the higher one of the individual scores – the outcome one would hope for.

Table 1 provides a range of information regarding the eight socio-demographic questions and the two questions on the nature and familiarity of the dyads. For each question, we show how the response options were coded for the subsequent statistical analyses (the alternative variable names in the 'Coding' column are used repeatedly below). Three types of explanatory variables can be distinguished in our data set:

- Dichotomous variables (GENDER, VOL, LOAN, RAND) were directly coded as dummies.
- The categories of ordinal variables (AGE, MOTHER, FATHER, FAM) were assigned integer values (0 / 1 / 2 / …) in ascending order. Note that this is only an approximation, as for example someone with AGE=2 is unlikely to be exactly twice as old as someone with AGE=1. Later in the analysis, to save degrees of freedom in the face of a reduced sample size, we form the variable PARENTS, which equals the sum of MOTHER and FATHER.
- Finally, there are two nominal variables, referring to migration and native language status, respectively. To operationalise them for statistical analysis, they were transformed into dummy variables by grouping the categories into only two values per variable. Thus, MIG=1 refers to any student who has some sort of migration background, and NGNL=1 ('non-German native language') means that a student has a native language other than German only. This recategorization was done with a view to avoiding very small categories while preserving as much as possible of the meaning of the original responses.

The table also lists the absolute and relative frequencies of the responses. The totals per variable may fall short of n=92 and 100%, respectively, due to non-responses. The final column contains the average individual scores per response group. The latter provide a first impression as to whether a variable is likely to be significant in explaining variations in performance later in the analysis. For example, students who engage in voluntary work clearly outperform those who do not, whereas the student loan status appears to have little impact. Category means that differ significantly from the overall mean of individual performance are marked accordingly with asterisks. The underlying one-sample t-tests take into account that the varying frequencies of the categories affects the standard errors of the sample means and the degrees of freedom to be applied to the t-distribution. The results should be considered a rough indication at best because some of the categories are very small and because this bivariate analysis does not consider the potential influence of confounding variables.

Table 1: Overview of the data

Variable	Response Options	Coding	Frequency abs.	Frequency rel.	Average Score
Gender	male	MALE=1	33	36%	3.27
	female	MALE=0	57	62%	2.75
Age	< 21 years	AGE=0	27	29%	3.41**
	21 to 25 years	AGE=1	48	52%	2.83
	26 to 30 years	AGE=2	9	10%	3.22
	> 30 years	AGE=3	6	7%	2.17***
Native language(s)	German only	NGNL=0	60	65%	3.40**
	other language only	NGNL=1	4	4%	1.75***
	multiple, incl. German	NGNL=1	23	25%	2.17***
	multiple, excl. German	NGNL=1	2	2%	2.00
Migration	none	MIG=0	66	72%	3.18
	parents immigrated	MIG=1	5	5%	2.40*
	grandparents immigrated	MIG=1	9	10%	2.22***
	other	MIG=1	8	9%	2.50**
Mother's education	no secondary educ. completed	MOTHER=0	5	5%	1.40***
	lowest secondary education	MOTHER=1	14	15%	2.43**
	Interm. secondary education	MOTHER=2	23	25%	3.30
	highest secondary education	MOTHER=3	22	24%	2.55**
	university degree	MOTHER=4	26	28%	3.77***
Father's education	no secondary educ. completed	FATHER=0	6	7%	1.50***
	lowest secondary education	FATHER=1	14	15%	2.57**
	Interm. secondary education	FATHER=2	14	15%	3.29
	highest secondary education	FATHER=3	15	16%	3.33*
	university degree	FATHER=4	40	43%	3.10
Voluntary work	yes	VOL=1	26	28%	3.69***
	no	VOL=0	64	70%	2.69
Student loan	yes	LOAN=1	37	40%	2.92
	no	LOAN=0	54	59%	3.00
Familiarity with dyad partner	not at all	FAM=0	23	25%	2.39***
	not much	FAM=1	5	5%	2.80
	fairly good	FAM=2	13	14%	3.46**
	very good	FAM=3	5	5%	3.60**
Dyad composition	self-selected, voluntary	RAND=0	23	50%	3.57***
	random	RAND=1	23	50%	2.17***

The asterisks in the final column indicate the results of t-tests of the differences between the category means and the overall mean individual performance: (*) statistically significant at the 10% level, (**) at the 5% level and (***) at the 1% level.

Table 2 lists Spearman's rank correlation coefficients among the variables, whose relaxed assumptions make it more suitable for our discrete variables than the Pearson correlation coefficient. The table omits absolute values below 0.1 because such low correlations are of little interest for our purpose and statistically unreliable, being below the critical value (10% significance level) of r=0.173. "INDIV" is the number of correct responses in the first, individual round of questions. The correlations in this column generally reflect the picture we obtained from the average individual scores in Table 1: Parental education levels are positively correlated with individual performance, as is the students' engagement in voluntary work. By contrast, the correlation coefficient for LOAN, our second indicator of SES, is negligible. Beyond that, the table primarily serves as a plausibility check of the data. Most of the observed relationships among the variables correspond to common-sense expectations. Also, all being well below 0.8 in absolute value, the coefficients suggest that multicollinearity is not going to be an issue in the regression results reported in the next section.

Table 2: Spearman's rank correlation coefficients > 0.1 or < -0.1 among the variables

	INDIV	MALE	AGE	FATHER	MOTHER	NGNL	MIG
MALE	0.146						
FATHER	0.218**	0.255**	-0.159				
MOTHER	0.194*	0.228**		0.519***			
NGNL	-0.390***	0.151		-0.335***	-0.183*		
MIG	-0.222**		0.205**	-0.249**		0.682***	
LOAN		-0.180*		-0.306***	-0.159	0.228**	0.137
VOL	0.364***	0.138		0.171		-0.205**	-0.168

* statistically significant at the 10% level, ** at the 5% level and *** at the 1% level.

So far, we have relied only on the information provided by the students during the in-class exercise. Yet about three percent of the answers to the socio-demographic questions were missing. These non-responses appear to have happened inadvertently – mostly due to clicker malfunctions. This we infer from the fact that the gaps in the data appear to be random; they are not clustered around any of the questions or participants. Nevertheless, those data gaps would pose a serious problem in the subsequent multivariate analyses, further reducing the usable sample size from what is already quite a small dataset. This would be particularly problematic when looking at the dyads, of which there are only 46.

Therefore, those missing socio-demographic values were imputed: A series of models was built to predict the missing data points for individual students and variables using whatever information was available from the other students (imputation by regression, Hernández-Herrera et al., 2022). The predicted values were then rounded to the nearest integer so as not to obtain, for example, a person who is three-quarters female. This more complete dataset yields the same qualitative results as the original one but tends to produce

somewhat more precise estimates. Based on the imputed data, the main statistical method applied to research questions 1 and 3 is Poisson regression, which takes into account the discrete nature of the dependent variable (individual/team performance). We used the EViews statistical software package.

4 Results

4.1 Individual Performance

Pursuant to research question 1, we now examine whether and how the students' socio-demographic characteristics determine their individual performance (INDIV), which forms the dependent variable in the regression models reported in Table 3. Model 1.1 shows (weakly) significant impacts on performance for age and non-German native languages (negative), as well as for maternal education and voluntary work (positive). Various interaction effects among the variables were also tested but did not yield any significant results.

Table 3: Determinants of individual performance

Variable	Model 1.1	Model 1.2
MALE	0.078 (0.127)	
AGE	-0.136* (0.079)	
FATHER	-0.021 (0.062)	
MOTHER	0.124** (0.061)	0.117** (0.053)
NGNL	-0.584** (0.229)	-0.376** (0.149)
MIG	0.223 (0.236)	
LOAN	0.154 (0.136)	
VOL	0.280** (0.130)	0.252** (0.128)
observations	92	92
R^2	0.275	0.206

Poisson regression. Constant term not reported. Standard errors in parentheses.
* statistically significant at the 10% level and ** at the 5% level.

Model 1.2 as a robustness check reduces the specification to those predictors whose coefficient estimates are significant at least at the 5% level (backward elimination). This model omits the formerly marginally significant AGE and closely confirms the coefficients of the three remaining variables, with slightly lower standard errors. In absolute terms, the effects are generally not negligible. For example, students who engage in voluntary work fared better in the test by $e^{0.252} - 1 \approx 28.7\%$ (note that Poisson regression coefficients do not follow the ordinary least squares interpretation). Having a native language that is not German is associated with a drop in performance by $1 - e^{-0.376} \approx 31.3\%$, which is almost one correct answer.

4.2 Dyad Formation

Research question 2 asks whether students tend to choose partners who are similar to them, which would result in a lower degree of socio-demographic diversity in 'voluntary' dyads. Table 4 provides the answers as suggested by our data. In this and all subsequent analyses, FATHER and MOTHER are replaced with their sum, PARENTS. For each variable listed in the table, as a measure of intra-dyad diversity, we report either the share of dyads in which both members are equal in the respective sense (for dummy variables) or the average difference between the members' values (for ordinal or discrete variables). The table shows how much the degree of diversity differs between the observed voluntary dyads and the hypothetical dyads we would have obtained from an entirely random pairing of the participants ('expected value'). The expected values follow from basic probability theory, whereas the standard deviations that underlie the t-tests and Cohen's d for the non-dummy variables required simulation.

We find that in terms of all eight characteristics, the members of the voluntary dyads were more similar to each other than one would expect with randomly composed teams. However, a (strongly) significant tendency for students to select similar partners exists only with respect to migration and native language status. In fact, there was only one dyad in which one member had a German-only native language background while the other one did not. This corresponds to a very large effect (cf. Cohen's h in the final column). Regarding the last four characteristics in the table, it remains unclear whether the students did not discriminate (more) in choosing a partner because they had no desire to do so (as may be assumed regarding the more salient properties of gender and age) or because they lacked information about these less visible traits that would have allowed them to pick more similar partners. Finally, the voluntary dyads are also more homogenous than the hypothetical random teams with regard to individual performance, though the difference is only weakly significant.

Table 4: Degrees of diversity in self-selected dyads versus hypothetical random dyads

Variable	Measure of Diversity	Voluntary Dyads	Expected Value	Difference	Cohen's	
					d	h
MALE	% of same-sex dyads	65%	54%	t = 1.122		0.224
AGE	average age difference between dyad members (categories)	0.609	0.833	t = 1.342	0.299	
NGNL	% of dyads with equal language status	96%	57%	t = 4.008***		1.028
MIG	% of dyads with equal migration status	83%	63%	t = 2.227**		0.458
PARENTS	average difference between the members' parents' education	2.217	2.484	t = 0.105	0.139	
VOL	% of dyads with equal voluntary work status	74%	59%	t = 1.540		0.320
LOAN	% of dyads with equal student loan status	65%	52%	t = 1.301		0.265
INDIV	average difference between the members' individual performance	1.391	1.925	t = 1.778*	0.371	

The t-statistics refer to the difference in means/proportions. *, ** and *** indicate that the differences are significant at the 10%, 5% and 1% level, respectively (two-tailed test).

4.3 Dyad Performance

In a final set of analyses, to address research question 3 we examine dyad performance, i.e. the number of correct responses that the dyads submitted to the second round of course-related questions. Importantly, for the first three models displayed in Table 5, all variables but RAND and FAM (which concern the dyad as a whole) assume a different meaning than in the previous analyses: They now indicate the *sum* of the dyad member's characteristics with respect to a given variable. For example, MALE here refers to the number of males per dyad and thus assumes the values 0 (two females), 1 (mixed dyad) or 2 (two males).

The single best predictor of dyad performance, judging by the coefficient of determination (R^2), is the sum of the members' individual scores (Model 2.1). This is not surprising considering that the dyads faced the very same questions as their individual members in the first round. Perhaps more interestingly, we find that this sum of the individual scores is a better predictor of dyad performance than the maximum of the two scores (results not reported in the table). This suggests that the "weaker" of the two members does make a positive contribution to the dyad's performance. This impression is also confirmed if we regress (again not reported) dyad performance on both the greater and the lesser individual performance per question. The latter variable has a positive influence that borders on

statistical significance, so holding the stronger member's performance constant, the weaker member still contributes to dyad performance.

Model 2.2 features all socio-demographic indicators plus the dyad's type (random versus voluntary, RAND) and the member's degree of familiarity (FAM) but omits INDIV. This is to enable a comparison with Model 1.1, but also because INDIV would have crowded out any performance effect of the socio-demographic variables. Even so, we find that only students having native languages other than just German has a weakly significant (negative) impact on dyad performance. Thus, though the model's overall explanatory power is quite similar to that of the corresponding model for individual performance, it yields fewer significant coefficient estimates.

Table 5: Determinants of dyad performance

Variable	Model 2.1	Model 2.2	Model 2.3
INDIV	0.114*** (0.027)		
MALE		0.028 (0.113)	-0.007 (0.184)
AGE		-0.071 (0.063)	-0.128 (0.117)
PARENTS		0.029 (0.029)	-0.036 (0.045)
NGNL		-0.308* (0.186)	-0.010 (0.259)
MIG		0.298 (0.213)	-0.329 (0.223)
LOAN		0.024 (0.105)	-0.015 (0.168)
VOL		0.120 (0.112)	0.110 (0.187)
RAND		-0.183 (0.284)	-0.026 (0.292)
FAM		-0.113 (0.128)	-0.118 (0.129)
variable type	sum	sum	difference
observations	46	46	46
R^2	0.519	0.282	0.176
Power	0.999	0.763	0.453

Poisson regression. Constant term not reported. Standard errors in parentheses.
* statistically significant at the 10% level and *** at the 1% level.

In Model 2.3, instead of the sums of the individual traits, we use the *absolute differences*: In the case of a dummy variable, say LOAN, the indicator equals 1 if one member receives a student loan while the other one does not, and 0 if they share the same loan status. For ordinal variables (e.g. AGE), the indicator equals the absolute value of the difference between the two members' individual values. The model thus tries to capture any performance effect of diversity or heterogeneity within the dyads. The results are quickly summarised: There are no significant coefficient estimates. Notably, neither a dyad's type nor the degree of familiarity among its members exhibits a significant effect in Models 2.2 and 2.3, whose low statistical power underlines these non-results.

5 Discussion

In support of H2, we found a negative significant impact on individual performance for students with non-German native language backgrounds, confirming the results of Schmucker and Häseler (2016). The data in part also support H1 in that maternal educational attainment, one of our proxies for SES, is associated with higher individual performance. Our finding that maternal education has greater influence on student performance than paternal education confirms prior research by Halle et al. (1997) and Corwyn (2004) which, however, concerns younger ages. It also accords with common sense: In most families, mothers still assume the lead role in raising their children and thus have more opportunity to pass on their values and act as role models. That being said, Wintre et al. (2011), studying Canadian undergraduates, find that it is paternal education that promotes student performance.

While not an immediate object of our research questions, it is worth noting that voluntary work has proved to be a solid predictor of high individual performance, in line with earlier studies (Schmucker & Häseler, 2016, 2017). Among the wide range of motivations to engage in voluntary work (Clary & Snyder, 1999; Hustinx & Lammertyn, 2003; Willems & Dury, 2017), Clary et al. (1998) highlight the role of career concerns – voluntary work looks good on a CV. In that sense, we might conceive of VOL as an instrument of an underlying unobserved variable, which is perhaps best described as career ambition. This reasoning establishes a connection between VOL and PARENTS, which is indeed confirmed by our data: In line with, for example, Simonson et al. (2021), we find these two variables to be positively correlated, though not significantly so. Well-educated parents tend to impress upon their children the importance not only of education but also of social commitment (Bekkers, 2007). Thus, SES as proxied by parental education likely drives individual performance both directly and indirectly, via voluntary work. More definite answers on this would require factor analysis, which is, however, beyond the scope of this paper.

Unlike our first indicator of SES, parental education, the second one does not seem to have an impact on student performance: Family income, as proxied by means-tested student loan status, does not significantly affect individual performance in any of the specifications. This non-result is in line with the findings by Wintre et al. (2011), who find that low family income does not constrain academic development. As per Tables 1 and 2, neither did the bivariate analyses show a notable association between student loan status and individual performance. This is an encouraging result: It appears that low family income is no impediment to academic achievement. Note, however, that we are only looking at those young people who made it to university in the first place.

Regarding Q2, a significant tendency for students to select similar partners was found only with respect to native language and migration status. For the former variable, the effect

is quite pronounced: There was only one dyad in which one member had a German-only native language background while the other one did not. Our finding of language-based dyad formation relates to Goins & Mannix (1999), who present evidence of team selection based on ethnicity. This is a cause of concern as, in an increasingly ethnically diverse environment, it may lead to segregation. On the other hand, particularly gender and age do not appear to be relevant in the choice of partners. To a certain extent, this result contradicts theory, especially the 'laws of attraction' (Byrne, 1971).

Hypotheses 3 and 4 concern dyad performance, which exceeds individual performance by only 0.85 correct answers – not as much as one might expect, given the potential benefits of teamwork and the additional time the students had to complete the same task once again. In a similar setting, Schmucker & Häseler (2021) likewise find that teams have only a marginal performance advantage over individuals. The present results suggest that dyad performance depends strongly on the members' individual performance but neither on their socio-demographic characteristics, nor on heterogeneity within the dyad (H4), nor on a dyad's type (voluntary versus random) (H3). In particular, diversity with respect to gender and age is unrelated to performance, as also found by Schneid et al. (2014) and Horwitz and Horwitz (2007). In addition, dyad performance does not depend on the degree of familiarity among the members.

6 Conclusion

Student bodies at most higher education institutions are becoming increasingly diverse and international. This development could pose a serious problem for teaching if that growing diversity also meant that the students' performance levels are diverging, i.e. if a systematic relationship existed between the students' personal characteristics and their academic performance. While a large body of literature has examined the association between personal attributes and performance, most of it relates to the work environment, with relatively little attention devoted so far to the academic sphere. Introducing several methodological improvements, the present study contributes to filling that gap by expanding on our previous empirical work with undergraduate management students in a similar setting, though this time with a focus on social socioeconomic and migration status. 92 students in the class "Introduction to Human Resource Management" were asked to form dyads, allowing us to examine their choice of team partner and to investigate any association between their socio-demographic characteristics and both individual and dyad performance, as measured by a ten-item, curriculum-related performance instrument.

While we generally found little evidence of dyad performance depending on either the members' personal characteristics or the degree of diversity regarding those characteristics within the dyad, a strong association was detected between some of the personal attributes and individual performance. Specifically, we found lower performance for students who have a migration background or, almost equivalently, whose native language is not (solely) German. Regarding SES, the findings suggest that the students' performance is to some degree inherited from their parents, but the crucial factor seems to be parental education, rather than family income. Finally, we examined whether the students tend to select partners who are similar to them. This was confirmed with respect to language and migration background but not regarding our two proxies of SES. In sum, the findings suggest that the integration of students with foreign backgrounds remains an important task for higher education institutions and students.

Future research might go into more detail regarding the students' backgrounds. While additional indicators of SES could be implemented, it would also be worth investigating what really drives the performance disadvantage of students with foreign language backgrounds. The present research design does not allow us to distinguish whether the disadvantage of these students is due to their language skills as such – perhaps inhibiting their comprehension of the German-language lectures and test questions – or rather to some other factors that merely correlate with native language. Future iterations of the study could include the score obtained in a brief language test as an additional explanatory variable for clarification on this point.

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