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Title: Studying Abroad during High School: Determinants and Effects

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Theoretical framework and background. In a globalized world, extended stays abroad are considered an important opportunity for acquiring and improving a variety of different skills, such as general functional knowledge or foreign language competencies (Cisneros-Donahue, Krentler, Reinig, & Sabol, 2012; Freed, Segalowitz, & Dewey, 2004; Kinginger, 2008; KMK, 2011; Sutton & Rubin, 2004). Furthermore, studying abroad has been acknowledged for its impact on the development of an individual's personality (Niehoff, Petersdotter, & Freund, 2017; Zimmermann & Neyer, 2013), employment, international labor market mobility, and wages (Di Pietro, 2015; Liwiński, 2017; Parey & Waldinger, 2011; Wiers-Jenssen, 2010), self-efficacy and self-esteem (Cubillos & Ilvento, 2012; Hutteman, Nestler, Wagner, Egloff, & Back, 2014; Petersdotter, Niehoff, & Freund, 2017), and intercultural skills (Clarke, Flaherty, Wright, & McMillen, 2009). In addition, early study abroad experiences were found to predict studying abroad in international contexts later on in life (Niehoff et al., 2017). Not surprisingly, most nations have implemented programs to foster participation in studying abroad, which is generally assumed to increase national economic growth and wealth through better education (e.g., British Council, 2014; European Commission, 2018; KMK, 2011; Tarrant, Rubin, & Stoner, 2014). In addition to studying abroad during university, there is also clear evidence that studying abroad is on the rise prior to university. For instance, in 2016 more than 80,000 international students studied abroad in the U.S. during high school (Farrugia, 2017). Given this significance, it is surprising that only limited research exists dealing with the factors that influence the decision to study abroad, especially regarding earlier studying abroad experiences during high school (for an exception, see Gerhards & Hans, 2013). Furthermore, few studies have investigated the effects of studying abroad during high school on students' foreign language competencies or other competencies such as mathematics. Considering longitudinal population data of students from the city state of Hamburg in Germany, this study extends previous research on predictors and effects of studying abroad during high school by including a broad set of predictors, such as standardized achievement measures, performance related self-concept, school satisfaction, and measures related to the socioeconomic status of the student. Furthermore, we employ a variety of propensity score matching (PSM) algorithms in order to estimate the effect of studying abroad during high school on competencies in English and mathematics at the end of high school. The study protocol was preregistered in accordance with the open science framework in advance, to avoid confusion of pre- and postdiction (e.g., Nosek, Ebersole, DeHaven, & Mellor, 2018)

Research questions. First, we investigated what student and school characteristics predict whether students will study abroad during high school. As found by Gerhards and Hans (2013), we expected social background variables to be important predictors of going abroad. Second, we investigated the effects of studying abroad in English-speaking countries during high school on

the development of skills in English and math (as measured by standardized achievement tests, grades in high school and course choice) after controlling for pre-existing differences. We assumed that studying abroad in an English-speaking country should have a substantial positive impact on standardized achievement, grades, and course choice in English in high school.

Data, methods, and modeling approaches. The analyses were based on data from three waves of the LAU longitudinal study (Learning Aspects of the Initial Situation and Learning Development). The LAU study contains longitudinal data of students from Hamburg, starting with students in Grade 5 (LAU 5), in Grade 7 (LAU 7), in Grade 9 (LAU 9), in Grade 11 (LAU 11), and in their last year of school (LAU 13). The last three waves (LAU 9 to 13) were used to assemble the data set ($N = 5,566$; around 13% reported to have studied abroad) for the proposed research project (e.g., Lehmann, Peek, Gänsfuß, & Husfeldt, 2002; Trautwein, Köller, Lehmann, & Lüdtke, 2007). More specifically, we focused on students who reported that they have studied abroad for at least half a school year in an English speaking country during upper secondary school (e.g., in the U.S. or the UK). In all waves, various subject-specific standardized achievement tests as well as student and parent questionnaires were administered. In order to analyze the data, we specified multiple logistic regression models to identify relevant predictors of studying abroad and employed propensity score analyses to estimate the average treatment effect on the treated (ATT) on the central outcome variables in English and mathematics (standardized achievement, grades in high school and the choice of advanced vs. basic courses). Missing data was treated using multilevel multiple imputation in Mplus (Muthén & Muthén, 2012). In all models, we controlled for the false discovery rate (FDR) using the Benjamini-Hochberg procedure (Benjamini & Hochberg, 1995). Hypothesis and analytical procedures were pre-registered at the open science framework (www.osf.io).

Results and conclusion. Results indicate that, in line with previous findings, aspects related to the socioeconomic background of the students had an impact on the decision to study abroad. Furthermore, achievement measures (e.g., class repetition and standardized achievement) were important predictors in this regard. Results of the propensity score analysis revealed that studying abroad led to substantial positive effects on all outcome measures in English (standardized achievement, course choice, and grades), compared to students who did not study abroad. For mathematics, depending on the matching algorithm employed, we only found a small effect on the final examination grades, whereas all other effects remained statistically insignificant. We conclude that studying abroad can indeed increase achievement in English and discuss implications for policy and practice.

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