

BELONGING AND BECOMING

**Supporting diverse student populations
in the transition to higher education**



Pieter M. van Lamoen

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education

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Belonging and Becoming

Supporting diverse student populations in the transition to higher education

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Ondersteuning van diverse studentenpopulaties in de transitie naar het hoger onderwijs

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Chapter 1

General introduction

Problem statement

Each academic year, new cohorts of first year students transition to higher education (HE), starting their academic journey in a wide variety of course programmes. Over recent decades, this transition to HE has become part of the life course of a growing and increasingly diverse group of young people (Marginson, 2016; OECD, 2024). Student participation rates in HE in the Netherlands, where this dissertation is situated, are no exception. The student population in Dutch HE grew by 22% between 2011 and 2024 and this group of students is characterised by diversity in various background characteristics (Statistics Netherlands, 2024a). Approximately 30% of students are first-generation in HE (FGHE), meaning that they have parents who did not study in HE (Spiegler & Bednarek, 2013). Additionally, the proportion of students with a migration background has increased from 15.9% in 2011 to 20.3% in 2023 and this percentage is expected to rise as more students with migration backgrounds are pursuing pre-academic tracks of secondary education (Statistics Netherlands, 2024b).

At first glance, enrolment statistics indicate a trend towards greater accessibility and representativeness of HE institutions. FGHE students and students with a migration background are historically underrepresented in HE and their participation can promote social mobility and foster more equity in societies. More equity because finishing HE provides valuable resources to graduates (Hout, 2012) and a diverse graduate population improves HE institutions' ability to connect with and address the needs of modern, diverse societies (Bowman, 2010; Bowman & Weaver, 2023; Lee et al., 2012). Yet, the current diversity of HE student populations does not reflect broader societal diversity. Due to pervasive obstacles on the path towards HE, students with a migration background and/or lower educated parents are still less likely to study in HE compared to those with a Dutch background and/or higher educated parents (Crul & Lelie, 2020; Rosinger et al., 2021). Moreover, for minority students who do enrol in HE, obstacles in education continue, as these students more often encounter systemic biases and discrimination within HE institutions (Colak et al., 2023), experience less welcoming learning environments (Gopalan & Brady, 2020; Hulzebos & Munnikma, 2022), and have lower achievement and completion rates (OECD, 2024) as compared to majority students.

To address inequities in enrolment and student success, many countries and HE institutions have set the aim to provide support for diverse student populations to succeed in HE (European Commission, 2023). This requires that institutions enhance accessibility of their course programmes for minority and disadvantaged student groups and create inclusive learning environments. Accessibility refers to the physical inclusion of students from minority and disadvantaged student groups in HE classrooms (Shaeffer, 2019). This entails implementing admissions policies that do not disadvantage minority groups but provide equitable opportunities to enrol into course programmes (Rosinger et al., 2021; Stegers-Jager, 2018). Inclusive learning environments refer to spaces where learning takes place in HE which respond to the diverse needs of all students and where students are provided with equal opportunities to engage meaningfully in learning, realise their capabilities, and develop academically and

professionally (Jensen & Jetten, 2016; Korthals Altes et al., 2024; Lairio et al., 2013; Shaeffer, 2019). This requires learning environments where students from diverse backgrounds feel welcomed, experience a sense of belonging, and are provided with the opportunities and resources required for their academic and professional development in HE (Mishra, 2020; Strayhorn, 2018). However, while there is some agreement on the necessity of accessible and inclusive learning environments, a recent knowledge agenda for HE (Netherlands Initiative for Education Research (NRO), 2024) identified that the preconditions and characteristics of such environments remain unclear.

To better understand factors that reduce opportunity gaps, improve accessibility, and contribute to inclusive learning environments, it is essential to closely examine students' transition to HE. This transition occurs approximately from students' last year in secondary education until the end of their first year in HE and appears consequential for students' opportunities and achievements (Briggs et al., 2012; Coertjens et al., 2017; Gale & Parker, 2014). Decisions made in the transition to HE by students (e.g., on educational type, level, and field) and institutions (e.g., on admissions criteria and support systems) have direct influence on educational trajectories. And students' achievements and experiences during the transition are highly predictive of student success at later stages (Brooman & Darwent, 2014; de Clercq et al., 2022). Successfully adopting new ways of learning, building supportive relationships, and developing a sense of belonging provide transitioning students with resources to succeed in HE (Mishra, 2020; van der Zanden et al., 2018) and paves the way for academic development and students' first steps in becoming a professional (Jensen & Jetten, 2016; Trede et al., 2012). Studies however also show that already existing inequities are amplified during educational transitions (Benner, 2011), including the transition to HE (Christie et al., 2008; de Clercq et al., 2022). Given the influence of transition on longer-term student success, researching whether and how background characteristics in interaction with learning environment factors influence the process of transition could provide important insights into the causes of opportunity gaps between student groups in HE.

That the transition to HE is a relevant explanatory stage for educational inequalities also implies that this stage is particularly suited for supporting diverse student groups, which is also shown in educational research (Leese, 2010; Sablan, 2014; van Herpen, 2019). By implementing policies and interventions at the transition to HE that both increase accessibility of HE course programmes and that address the needs and challenges of diverse student populations, HE institutions can set the stage for diverse and inclusive learning environments. Currently, transition support is provided by HE institutions in various ways. Designing clear and valid admissions policies for instance help prospective students with choosing a course programme and setting expectations (Niessen et al., 2018; Stegers-Jager, 2018) and interventions such as pre-academic support programmes and small-group education facilitate social and academic adjustment (Brouwer et al., 2019; van Herpen et al., 2020). Whether such initiatives contribute to accessible and inclusive learning environments has not been studied extensively however

and more research is needed to discover whether transition support sufficiently addresses the needs and challenges of diverse HE student populations.

The current dissertation contributes to the needed knowledge on the preconditions and characteristics of accessible and inclusive learning environments in the transition to HE by addressing two general objectives: 1) to identify factors that contribute to opportunity gaps between minority and majority groups of students at different stages of the transition to HE, and 2) to study how diverse groups of students can be supported in the transition to HE. The first general objective is informed by research showing the consequences of transition for longer-term student success, including students' academic achievement and their development, or 'becoming', of a professional (Coertjens et al., 2017; Gale & Parker, 2014; Ibarra, 1999). The second general objective is informed by research highlighting the transition as a window of opportunity for offering student support. Addressing this objective provides HE institutions with new insights in how to set the stage for accessible and inclusive learning environments, where diverse student cohorts can achieve academically and develop as professionals.

In this introductory chapter, I firstly discuss current literature on the transition to HE, student success, and opportunity gaps. Then, I provide an overview of the five empirical studies that were conducted to address the general research objectives. Finally, I provide a short overview of the empirical chapters that are included in this dissertation.

The transition to higher education

Defining the transition to HE as a longitudinal process

Before exploring the experiences of diverse transitioning students and the role of HE institutions in providing support, it is necessary to define what the transition to HE entails and how student success can be conceptualised at different stages of transition.

Across the educational and sociological literature, school transitions into new educational levels and/or institutions are emphasised as pivotal moments in educational trajectories (Benner, 2011; Coertjens et al., 2017; Ecclestone et al., 2009). These transitions, including the transition from primary to secondary school and then to vocational education or HE, include major changes in students' study context and role requirements (Coertjens et al., 2017; de Clercq et al., 2022; Visser et al., 2023). An important aspect of the transition to HE is that this transition typically coincides with the developmental stage of emerging adulthood, a period characterised by identity exploration, increased autonomy, and significant life changes (Arnett, 2000). Choosing an HE degree programme is intertwined with self-discovery and exploration regarding interests and professional career paths (Lairio et al., 2013; Vulperhorst et al., 2018),

and many transitioning students experience multiple transitions simultaneously, as they move out from their parental home and start a job next to their studies (Arnett, 2016).

The many changes that transitioning students go through require that they firstly develop an understanding of their new circumstances and role requirements and eventually adjust to their new situation. Previous research on the transition to HE emphasises that this process of developing understanding and adjusting should be

understood as a longitudinal process, and not as a one-off event (Christie et al., 2008; Gale & Parker, 2014). During the longitudinal process of transition, students go through various stages which are each characterised by different tasks and requirements (Coertjens et al., 2017). A dominant model in literature on transition to HE is Nicholson's (1990) transition cycle (Coertjens et al., 2017; Torenbeek et al., 2010; van Herpen, 2019; Willems, 2021). This model, which is originally developed for studying individuals' work role transitions, distinguishes four subsequent stages, being: preparation, encounter, adjustment, and stabilisation (see Figure 1). Central to Nicholson's transition model is that experiences and achievements at one stage exert influence over what happens at next stages (Nicholson, 1990).

At the *preparation* stage, the core task for individuals is to achieve a state of readiness. Applied to the transition to HE, this means that students orientate on and choose HE course programmes, meet formal requirements for enrolment into course programmes by obtaining required credentials, and develop expectations about studying (Torenbeek et al., 2010). The preparation stage mostly occurs during students' last year in secondary education. How well students prepare influences their experiences at the next stage, the so-called *encounter* stage. At this stage, students have their first confrontation with the new learning environment and academic culture and try to make sense of it (Christie et al., 2008; van Herpen et al., 2020). The encounter stage typically occurs during students' first weeks in HE and is followed by the *adjustment* stage. At this third stage, student actively attempt to cope with the demands of the new learning environment and gradually adjust their attitudes and behaviours to succeed (de Clercq et al., 2018). For most students, this stage lasts until the end of the first year in HE, after which they ideally adapt during the *stabilisation* stage. This is a more stable stage in which students only make small adjustments to their behaviour. Furthermore, reaching stabilisation not only implies that students have adjusted and achieve within their current context, but also that they perceive opportunities and have access to resources that prepare them for future transitions, such as to further educational endeavours (e.g., minors, masters, internships) and professional careers.

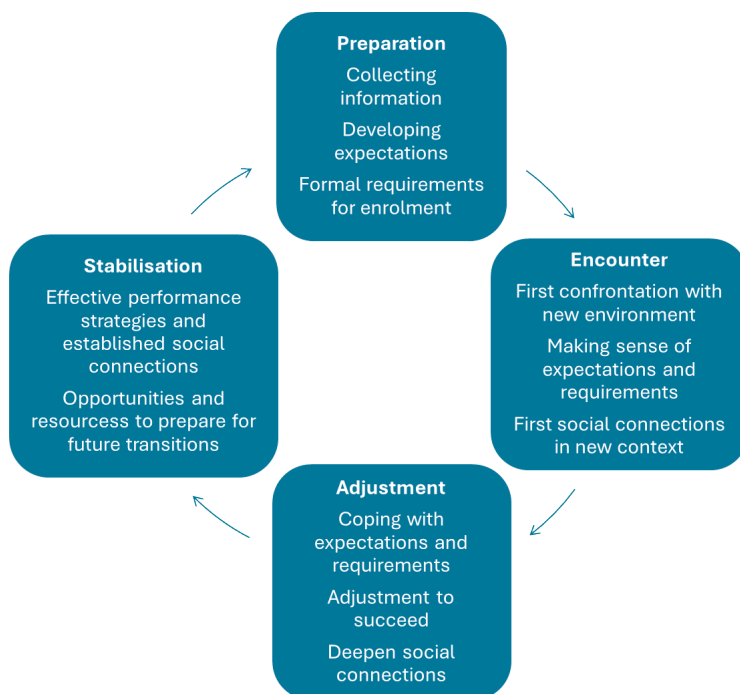


Figure 1 Stages of transition according to Nicholson's (1990) transition model

Student success at different stages of transition to HE

Studying various stages of transition requires some conceptualisation of what it means to be successful at these stages. During the preparation stage, one of the major tasks of prospective students is choosing and enrolling into HE course programmes (Demulder et al., 2024; de Vries et al., 2024;). HE institutions significantly influence this process by setting admissions criteria that determine students' eligibility for enrolment (Rosinger et al., 2021). In the Netherlands, students who have obtained the required educational credentials (e.g., pre-university education, VWO in the Netherlands) are in principle eligible for HE course programmes, but institutions may require prospective students to participate in additional selective admissions procedures (Dutch Inspectorate of Education, 2023). Internationally, these selective admissions practices are no exception, as many institutions across countries use them (Koljatic et al., 2021; Rosinger et al., 2021). Given the major influence of selective admissions tests on students' further educational trajectories, we focused on students' performance on these tests as a success outcome at the preparation stage of transition to HE.

Prior research on the later stages of transition to HE (i.e., encounter, adjustment, stabilisation) has often focused on study success outcomes, including first year dropout and academic achievement in courses (Coertjens et al., 2017; van Rooij et al., 2018). These outcomes indeed

appear to be relevant at the transition to HE, as dropout levels are particularly high during students' first year in HE (Crede & Niehorster, 2012; Willcoxson et al., 2011) and the grades that students attain in their first year are highly predictive of their further academic achievement (de Clercq et al., 2022; Richardson et al., 2012; Robbins et al., 2004). Much research on the transition to HE therefore has the aim to reduce first year dropout and enhance achievement and has reported a broad variety of factors that impact these outcomes. On the student level, these include academic preparedness, self-regulated learning, and motivation (Richardson et al., 2012; van Rooij et al., 2018) as well as students' social integration and support networks (Mishra, 2020; Stadtfeld et al., 2019). On the institutional level, these include the quality of teaching, availability of academic resources, and the design of the curriculum and learning environment (de Clercq et al., 2021; Torenbeek et al., 2010; van der Zanden et al., 2018).

While study success outcomes are certainly important in students' academic careers, scholars increasingly call for a broader definition of student success (Melguizo et al., 2021; van der Zanden et al., 2018). In line with Nicholson's (1990) transition model, which asserts that stabilisation implies a condition that allows individuals to prepare for future transitions, this dissertation focuses on the transition as a period that sets the stage for students' further academic and professional development. This means that students not only achieve well and persist in the HE learning environment, which could be regarded as minimal condition for success, but also that they feel at ease in the learning environment and can access the resources that are needed for their further academic and professional development. Specifically, this means that the various subprojects in this dissertation adopt a variety of outcome measures additional to academic achievement, including sense of belonging, academic self-efficacy, professional identity, and on-campus social capital.

Sense of belonging refers to students' feelings of connectedness with the HE community, that one is accepted and that one fits in (Dias-Broens et al., 2024; Walton & Cohen, 2011). The cultivation of students' sense of belonging is central in many HE institutes' strategies to promote student success, wellbeing, and motivation (Allen et al., 2024; Gopalan & Brady, 2020). Feeling a sense of belonging can motivate students and engage them more deeply to their studies (Yeager et al., 2016) and appears particularly relevant for students who newly encounter and adjust to the HE learning environment at the transition to HE (Strayhorn, 2018; van Herpen et al., 2020) and for student groups who are underrepresented in HE contexts (Strayhorn, 2018; Walton & Cohen, 2011).

Academic self-efficacy (Brooman & Darwent, 2014; de Clercq et al., 2022) can be described as students' perception of their ability to learn and perform in the educational context (Bandura, 1997). Academic self-efficacy is strongly related to academic achievement (Richardson et al., 2012; Robbins et al., 2004) and contributes to the resilience of transitioning students to cope with the potentially stressful and demanding changes (Kyndt et al., 2019).

Professional identity is the self that has been cultivated to perform competently and legitimately within a profession and encompasses an awareness of and connection to the values, attitudes and beliefs of particular professional fields (Tomlinson & Jackson, 2021; Trede et al., 2012). Whereas sense of belonging refers to students' subjective connection with the HE learning environment and its' communities, professional identity refers to students' connection with their future work field, related to the course programmes wherein students are enrolled (e.g., psychology, medicine, engineering; Reid et al., 2008). Students' professional identity is emphasised as crucial for achieving career success at the education-to-work transition (Jensen & Jetten, 2016; Tomlinson & Jackson, 2021) and promotes academic adjustment and retention by enhancing study motivation and engagement (Burlleson et al., 2021; Jensen & Jetten, 2016).

Social capital refers to an individual's access to and mobilisation of valuable resources, such as information or support, through connections and networks of relationships (Coleman, 1990; Lin, 2001). From a social network perspective, social capital is viewed as the benefits that individuals gain from their social networks. According to Lin (2001), these networks provide access to resources that can enhance an individual's ability to achieve their goals. In the context of HE, on-campus social capital refers to the resources (e.g., support, information) that students can access and mobilise through their relationships with actors on campus, such as peers and teachers (Brouwer et al., 2016; Mishra, 2020; Neves et al., 2019; Wittner et al., 2020). Consistently, studies have shown that both non-academic (e.g., friendships) and academic (e.g., help-seeking) relationships are positive predictors of achievement and retention in HE (Mishra, 2020; Stadtfeld et al., 2019).

Sense of belonging, self-efficacy, professional identity, and social capital may support students while navigating the changes and challenges at the transition to HE, and help students with staying motivated and performing well, particularly when experiencing difficulties (Allen et al., 2024; Jensen & Jetten, 2016; Kyndt et al., 2019; Trede et al., 2012; van der Zanden et al., 2018). These psychosocial factors are also indicators of stabilisation in Nicholson's (1990) transition cycle model, as they provide students with the tools and resources needed for future transitions (e.g., to masters, internships, work). Cultivating a sense of belonging for instance ensures that students feel connected to and valued within their academic environment and a well-defined professional identity offers a sense of purpose and direction to students by helping students with connecting their current educational endeavours with their future professional goals (Allen et al., 2024; Jensen & Jetten, 2016). Social capital, through strong networks, provides essential support (e.g., information, emotional support) and opportunities, preparing students for changes and challenges in the future, including the transition from education to work (de Schepper et al., 2024; Lin, 2001; Mishra, 2020).

Diversity and inequities at the transition to HE

How students experience and succeed in HE is influenced and coloured by various background dimensions, including socioeconomic background and generation in HE status (Scanlon et al., 2020; Schwartz et al., 2018; Veldman et al., 2019a), migration background (Carter et al., 2013; Colak et al., 2022), LGBTQI+ identity (Kirsch et al., 2015; Sotardi et al., 2022), and disability status (Dangoisse et al., 2020; Sefotho & Onyishi, 2021). In this dissertation we specifically focus on two background dimensions, being students' generation in HE status and migration background. Generation in HE status refers to the educational background of students' parents, with students whose parents did not attend HE being referred to as first-generation in HE (FGHE) students, and students with parents who did attend HE as continuing generation in HE (CGHE) students (López et al., 2023; Spiegler & Bednarek, 2013). Migration background, as defined by Statistics Netherlands (2022)¹, refers to whether a student or one/both of their parents was born outside of the Netherlands. This includes both first-generation migrants, who were born abroad themselves, and second-generation migrants, who were born in the Netherlands, but have at least one parent born abroad.

Prior educational research has documented opportunity gaps in HE between FGHE and CGHE students and between students with and without a migration background. A recent literature review of López and colleagues (2023) for instance showed that studies consistently find lower grade performance and persistence among FGHE students compared to CGHE students. They further concluded that psychosocial variables, including sense of belonging, (perceived) social support, and help-seeking behaviour explained differences in academic achievement between FGHE and CGHE students. This corresponds with studies showing a lowered sense of belonging among FGHE students (Gopalan & Brady, 2020; Veldman et al., 2019a). Similarly, studies repeatedly and consistently find that students with migration backgrounds achieve lower grades, dropout more often from HE (Meeuwisse et al., 2010; OECD, 2024; ResearchNed, 2023), and experience less belonging in HE (Colak et al., 2022; Hulzebos & Munniksma, 2022).

Nicholson's (1990) transition model provides some explanation for the influence of background characteristics on transition experiences and success, as it describes that preparation might be influenced by students' home environment, and the encounter and adjustment stage might be affected by the inclusiveness of the new environment where students find themselves at transition. However, this theoretical transition model does not explain which specific factors might play a role as background-related facilitators and barriers during the transition to HE. In order to reach a deeper understanding of the role of these factors, this dissertation draws

1 In 2022, Statistics Netherlands altered their classification of population by origin (see for this new classification: Statistics Netherlands, 2022). This new classification was however not yet introduced in the university's educational research database that was used for this dissertation. We therefore employ the classical classification of migration background that was used by Statistics Netherlands before 2022.

on theory and research on cultural and social capital in education (Bourdieu & Passeron, 1977; Coleman, 1990; Lin, 2001) and on exclusionary and discriminatory processes in (higher) educational environments (Colak et al., 2022; Hurtado & Carter, 1997; Hussain & Jones, 2021).

In HE research, cultural and social capital theory are primarily used to explain disparities between FGHE and CGHE students (Ostrove & Long, 2007; Soria & Stebleton, 2012; Spiegler & Bednarek, 2013), and these theories have also been used to explain migration status-/ethnic-based opportunity gaps in HE (Mishra, 2020; Wolff, 2013). While our discussion of social capital above, as a measure of transition success, is concerned with on-campus capital (i.e., relationships with peers and teachers in HE), these theories on inequalities are primarily concerned with capital that students derive from their relations outside of the HE context.

Besides cultural and social capital, research shows that HE institutions and learning environments play an important role in pertaining inequalities due to exclusionary and discriminatory processes. Studies of Colak et al. (2022, 2023), Hurtado and Carter (1997) and Hussain and Jones (2021) provide an understanding of how exclusionary and discriminatory experiences manifest in higher education (HE), particularly for students with a migration background and FGHE students. These studies highlight the systemic barriers that these students face, such as biased institutional policies and practices that perpetuate inequality (Hurtado & Carter, 1997; Hussain & Jones, 2021). They emphasise the role of campus climate in shaping students' experiences, noting that a hostile or unwelcoming environment can significantly hinder the academic and social integration of these students (Bowman & Brandenberger, 2012; Colak et al., 2022; Hurtado & Carter, 1997).

Unequal access to cultural and social capital and exclusionary and discriminatory practices could hinder students' opportunities for success at the transition to HE, thereby negatively impacting the different outcomes that are of relevance at the subsequent stages of transition to HE. In the following sections, each stage of the transition is examined in more detail, with attention to factors that may contribute to inequities in student success and strategies to support diverse student groups. Each section concludes by formulating sub-aims for the empirical studies presented in this dissertation, which are each situated at different stages of the transition to HE and together advance and contribute to the two overarching general objectives.

Challenges and support at the stages of transition

Preparation: Enrolling into selective course programmes

Choosing and enrolling into HE undergraduate course programmes is one of the major tasks faced by students at the preparation stage of transition to HE (Demulder et al., 2024). On an individual level, background characteristics influence the pre-enrolment process, by affecting students' access to important resources that support preparation (Perna, 2006). The financial resources and social and cultural capital provided by the family shape students' decisions during the preparation stage, such as on the level and type of education they pursue (Vietze et al., 2022), and influence their preparedness to meet admissions requirements of HE institutions (Mulder et al., 2022a). Regarding the latter, studies show, for instance, that CGHE students and non-migrant students are more likely to attend prestigious universities and are better equipped to navigate and succeed in application processes (Bowman & Bastedo, 2018; Dutch Inspectorate of Education, 2023). Thus, shifting from an individual to an institutional perspective, it becomes evident that application processes installed by HE institutions play an important role in the success of diverse students at the preparation stage of the transition to HE.

An important distinction in HE undergraduate admissions processes is between non-selective and selective course programmes. While students can enrol in non-selective course programmes after meeting the basic requirements (e.g., pre-university secondary education), selective course programmes involve additional assessments and a competitive admissions process. In the Dutch context, around 17% of undergraduate course programmes use an additional selective procedure for admitting students (Dutch Inspectorate of Education, 2023). This may have a negative effect on equitable opportunities for enrolment into course programmes and, consequently, diversity within student populations. Prior research shows that students from underrepresented minority backgrounds have lower probabilities to enrol into HE (Rosinger et al., 2021) and research that has been conducted in the Netherlands specifically indicates that students with a non-Western migration background are particularly disadvantaged by selective admissions practices (Mulder et al., 2023; Stegers-Jager, 2018).

While HE institutions have limited control over many processes that cause inequities at the preparation stage of transition, such as preparatory activities in secondary education and information that students acquire in the home environment, they do have direct influence over admissions policies. This includes choosing the instruments used in the admissions process. This is important, as one main conclusion from HE admissions research is that the common practice to select students based on prior academic performance reduces selection probabilities for ethnic minority students (Richardson et al., 2012; Rosinger et al., 2021; Stegers-Jager, 2018). Yet, HE institutions typically not only select based on prior academic achievement but use composite scores that combine grades with other types of admissions

instruments (Fikrat-Wevers et al., 2023; Kurysheva et al., 2019). In the Netherlands, 70% of selective course programmes base their admissions decisions on a combination of grades with assessments of motivation and 30% use content-specific exams (Dutch Inspectorate of Education, 2023). As these non-grade admissions instruments often show smaller group differences between majority and minority students, combining grades-based selection with non-grades instruments has been suggested as a more equitable selection method in HE (Bradburn & Schmitt, 2019; Stegers-Jager, 2018). Following up on these suggestions by using assessments of motivation and content-specific exams might enhance ethnic minority students' admissions probabilities.

While grades-based selection and its' role in reproducing inequalities is often researched, this is less the case for motivational assessments and content-specific exams, despite their common use in HE. Particularly, there is a lack of research on these instruments within high-stakes selection contexts, where assessment outcomes influence actual educational outcomes in the sense that it will mean enrolment or not in the specific programme (Niessen & Meijer, 2017). Because the validity and reliability of assessment instruments can vary greatly between low-stakes and high-stakes settings, it is difficult to draw conclusions about selection instruments, including score-differences between groups, based on research conducted in low-stakes contexts (Peterson et al., 2011). Furthermore, because of the high-stakes of admissions decisions, it is important not only to study score differences between groups on admissions instruments, but also to study dimensions of validity (e.g., predictive validity: do test scores relate to relevant outcomes, such as academic performance?) and fairness (e.g., differential prediction: do test scores predict these outcomes similarly for minority and majority groups?; Berry, 2015; Niessen et al., 2019). A combined analysis of score-differences, predictive validity, and differential prediction of admissions instruments allows for an integral and comprehensive conclusion about potential inequities caused by the instruments as well as their quality.

Given the important role of admissions procedures in reducing or reproducing inequalities at the preparation stage of transition to HE, and the direct influence of HE institutions on their admissions policies, **a first sub-aim** of the current dissertation – contributing to the two general objectives discussed above – is to shed light on score differences, predictive validity, and differential prediction of three types of often used admissions instruments in HE: prior academic achievement, a content-specific exam, and assessments of motivation. Specifically, we aim to study score differences on these instruments between ethnic minority and ethnic majority students, and we study the extent to which test scores predict students' academic performance during their first year in HE (i.e., predictive validity), and whether this prediction is similar for students with an ethnic majority and ethnic minority background (i.e., differential prediction).

Encounter: Recognising diversity in transition support

At the encounter stage, students experience their first confrontation with the new HE learning environment and try to make sense of its' characteristics and requirements (Coertjens et al., 2017). Educational literature has identified this stage as particularly vulnerable within students' educational trajectories (de Clercq et al., 2022), yet also as a time that provides a window of opportunity to support first year students (van Herpen et al., 2020). Many HE institutions provide this support by organising pre-academic or summer-bridge programmes. These interventions typically occur during the summer before students formally enrol into their actual course programme and often include modules on study skills, time management, and campus organisation (Greer et al., 2023; Sablan, 2014). Prior studies show that pre-academic programmes can be effective in facilitating students' transition to HE by affecting academic achievement (van Herpen et al., 2020), retention (Bahnson et al., 2025), and relationships with peers and faculty (Beard et al., 2023; van Herpen et al., 2020).

In the design and effect evaluation of pre-academic programmes, an important question pertains to whether such programmes succeed in addressing the varying challenges that diverse groups of students encounter upon enrolment in HE. Prior research indicates that, to reach this aim, it is crucial to adopt programme strategies that explicitly acknowledge the way in which students' backgrounds affect experiences and challenges (Melguizo et al., 2021; Schwartz et al., 2018). An illustration of this importance is provided by a study of Hausmann et al. (2009), who investigated an intervention that aimed to influence students' sense of belonging by sending affirming messages and university gifts to students to emphasise that they are valued members of the campus community. This intervention increased ethnic majority students' sense of belonging but appeared to be non-effective for increasing ethnic minority students' belonging. Not only does this example illustrate the need to adopt diversity-sensitive intervention strategies, particularly for outcomes such as sense of belonging, it also indicates the need for studying heterogeneous effects of transition programmes.

Two strategies that can be adopted to offer inclusive support at the transition to HE are 1) acknowledging and teaching participants (i.e., prospective students) how their identities influence experiences in HE, and 2) enhancing mobilisation of on-campus social capital (Gurin et al., 2002; Schwartz et al., 2018; Stephens et al., 2014). Prior research indicates that these strategies are particularly relevant to support FGHE students, for instance by positively impacting their grades and consequently decreasing the achievement gap between FGHE- and CGHE-students (Schwartz et al., 2018), but less research has been conducted on the effectiveness of such interventions to impact psychosocial outcomes, including sense of belonging and academic self-efficacy (Melguizo et al., 2021; van der Zanden et al., 2018).

As a **second sub-aim**, the current dissertation attempts to analyse the effectiveness of a pre-academic programme in supporting diverse students' transition to HE. This programme aims to support all transitioning students, but adopts specific strategies to address experiences

of FGHE-students, based on theories and prior research on difference-education (Denson, 2009; Gurin et al., 2002) and social capital (Parnes et al., 2020; Schwartz et al., 2018). Using a quasi-experimental pre-test post-test design, the effects of this programme are examined on various transition outcomes (academic achievement, sense of belonging, academic self-efficacy), via the mobilisation of on-campus social capital.

Encounter and adjustment: Emerging peer networks

After the encounter stage, first year students go through the adjustment stage. The adjustment stage lasts from students first weeks in HE, after their first experiences at the encounter stage, until approximately the end of the first year (van Herpen, 2019; Willems, 2021). A central aspect of the encounter and adjustment stage of the transition to HE is that new networks of supportive peer relationships emerge. At the start of the academic year, students newly enrol into course programmes together with a cohort of peers who are mostly strangers, and gradually build new supportive relationships with these peers (Stadtfeld et al., 2019; van Duijn et al., 2003). These peers are an important source of social capital in the HE context.

For students' opportunities to learn with and from their peers, the way in which the emerging peer networks develop is important. Specifically, for students to access the social capital (e.g., information, social support) that is needed to succeed in HE, it is important that they become *embedded* in the peer networks (Brouwer et al., 2016; Mishra, 2020). Furthermore, for students to access diverse sources of social capital, it is important that the peer networks do not *segregate* but that students build relationships with peers coming from different backgrounds than themselves (e.g., different migration background; Bowman & Weaver, 2023; Gurin et al., 2002). Current research however shows that minority students face difficulties with becoming embedded in peer networks (Ostrove & Long, 2007; Özbağcı et al., 2023) and that, regardless of their background, students generally tend to build relationships with similar others, leading to network segregation (Colak et al., 2019; Weber et al., 2020).

To support minority students with becoming embedded in emerging peer networks and to foster diversity within these networks, scholars have emphasised the importance of inclusive learning environments where students feel a sense of belonging (Bowman et al., 2019; Wilson et al., 2015). As a significant driver of individual behaviour in social contexts (Strayhorn, 2018), a sense of belonging likely influences students' relationship formation and the encouragement of positive interactions between students from different backgrounds (Bowman et al., 2019; Thijs & Verkuyten, 2014). Cultivating a sense of belonging among students may be essential for enhancing diverse peer relationships and promoting inclusivity in HE.

Existing research however remains inconclusive about the role of sense of belonging in diverse peer networks. For instance, studies did not adopt a longitudinal social network approach while studying the role of sense of belonging in peer networks. Such an approach is necessary

however to investigate the dynamic way in which both networks and sense of belonging develop at the transition to HE (Kreutzmann et al., 2018; Steglich et al., 2010; Wasserman & Faust, 1994). As **a third sub-aim**, this dissertation therefore seeks to uncover how students' background characteristics (i.e., generation in HE-status and migration background) and their sense of belonging shape the emergence and development of supportive peer networks by adopting a longitudinal social network approach.

Encounter and adjustment: Belonging and professional identity in peer networks

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At the encounter and adjustment stage, students are supported by small-group, student-centred, and problem-driven learning environments (Brouwer et al., 2022; Severiens et al., 2015; Wijnia et al., 2024). These environments facilitate interactions with peers and teachers, emphasise students' active role in learning and knowledge construction, and employ real-world problems to engage students (Loyens et al., 2023). Such settings may enhance students' sense of belonging and facilitate professional identity development, which are crucial for student success and motivation (Strayhorn, 2018; Trede et al., 2012). Social relationships play a significant role in forming a sense of belonging and professional identity, with small-group teaching providing opportunities to build supportive relationships (Brouwer et al., 2019; Meeuwisse et al., 2010). These connections offer the resources and safety necessary for professional identity development, especially when students collaborate on real-world problems relevant to their future professions (Tan et al., 2016).

Despite these insights, several research gaps remain. There is a lack of understanding concerning inequalities in HE, particularly how diverse backgrounds affect students' sense of belonging and professional identity development. Additionally, the longitudinal relationship between sense of belonging and professional identity development, especially at the transition to HE, is not well understood. Prior research suggests that professional identity evolves through encounters with the culture and practices of professional fields (Reid et al., 2008), but the dynamic interplay between sense of belonging and professional identity over time remains unexplored (Sternszus et al., 2024; Walton & Cohen, 2011). Furthermore, there is a shortage of longitudinal social network studies examining the role of peer relationships in sense of belonging and professional identity development, which is crucial for disentangling selection and influence processes in social networks (Snijders et al., 2010; Steglich et al., 2010).

Informed by these gaps, **a fourth sub-aim** of this dissertation is to study differences between majority and minority students' sense of belonging and professional identity at the encounter and adjustment stage of transition to HE, examine how sense of belonging and professional identity are related over time, and investigate the dynamic and mutual co-evolution of peer networks with sense of belonging and professional identity.

Aims and overview of the current dissertation

Following the general objectives as described in the problem statement, namely to 1) identify factors that contribute to opportunity gaps between minority and majority groups of students at different stages of the transition to HE, and 2) study how diverse groups of students can be supported in the transition to HE as a foundation for their academic and professional development, the current dissertation addresses the four sub-aims which are discussed above. To reiterate, these aims are to investigate:

1. The predictive validity over academic achievement of various admissions instruments, and score differences on and differential prediction of these instruments between students with and without a migration background (Chapter 2);
2. The effects of a pre-academic programme on sense of belonging, academic self-efficacy, academic achievement, and social capital, and differences in these effects between FGHE students and CGHE students (Chapter 3);
3. The role of students' background characteristics and sense of belonging in the emergence and development of supportive peer networks (Chapter 4);
4. The development of sense of belonging and professional identity at the transition to HE over time, and the influence on these measures of student background characteristics and peer networks (Chapter 5 and 6).

Each of these aims are related to and studied at different stages of the transition to HE, with the first aim being situated at the preparation stage, the second at the encounter stage, and the third and fourth at the encounter and adjustment stage. As such, the present dissertation contributes to current knowledge on diverse students' barriers and facilitators of transition success at different stages of this transition. By adopting measures such as social capital, sense of belonging, and professional identity development, this dissertation further advances on current research by going beyond academic achievement-related measures and adopting outcomes related to students' personal and professional development in HE. The four aims are addressed in five chapters, each describing an empirical study, using different types of data and research methods (see also Table 1).

The first research aim, regarding selective admissions in HE, is addressed in **Chapter 2**. This chapter describes an investigation of various selective admissions instruments (pre-university academic achievement, a curriculum-sample test, and assessments of motivation). Central to this chapter is the question whether students with and without a migration background attain different scores at the different admissions instruments, potentially leading to inequalities in admission probabilities, and whether the curriculum-sample test and the assessments of motivation might improve equal opportunities for students with a migration background in getting admitted into the programme. Next to score differences, Chapter 2 addresses the question whether the different instruments are predictive of students' academic achievement and whether this predictive validity is equal or differential between students with and without a

migration background. These questions are answered by making use of real-world high-stakes selective admissions data to detect score differences and differential prediction between participants (Aguinis et al., 2010; Wiernik & Dahlke, 2020).

Chapter 3 addresses the second research aim. This chapter describes a study that uses a quasi-experimental pre-test post-test design to investigate the effects of an online pre-academic programme on three measures of transition success, being sense of belonging, self-efficacy, and academic achievement. This pre-academic programme aimed to offer support to both FGHE students and CGHE students, by addressing the way in which student backgrounds influence experiences at the transition to HE and by supporting students with acquiring on-campus social capital by building relations with peers and faculty. To study whether the programme reached its aims, beyond impacting average levels of sense of belonging, academic self-efficacy, and academic achievement in the general student population, we studied whether effects differed between FGHE and CGHE students and whether effects on the three measures of transition success were mediated by a positive effect on students' mobilisation of on-campus social capital.

The third research aim of this dissertation is addressed in **Chapter 4**, which investigates how the emergence and development of student peer relations on campus at the encounter and adjustment stage of transition is influenced by student background characteristics (generation in HE-status, migration background) and how sense of belonging influences the development of these relationships. Studying peer relationships is important, as these are an important source of on-campus social capital for students. To investigate the emergence and development of student peer relations, Chapter 4 adopts a longitudinal social network approach. This implies that complete sociometric data of friendship and help-seeking relations were collected across three timepoints in the first semester among 247 first year students enrolled in a psychology course programme. These data were analysed with stochastic actor-oriented models (Snijders et al., 2010), which are particularly suited to analyse longitudinal social network data.

The fourth aim is addressed both in Chapter 5 and 6. Firstly, in **Chapter 5** the professional identity development of first year law students was studied at the encounter and adjustment stage of transition to HE. Specifically, this study investigates how students' sense of belonging affects professional identity development, and whether students' sense of belonging and professional identity vary depending on students' generation in HE-status and migration background. Two waves of survey data were collected within a law course programme embedded in a small-group learning environment that makes use of problem-based learning.

Chapter 6 examines how students' sense of belonging and professional identity are influenced by peer relations within a small-group learning environment. Studying the contribution of peers on students' sense of belonging and professional identity can best be done by adopting a longitudinal social network design (Snijders et al., 2010). This design allows to account

for a potential alternative explanation for the relationship between sense of belonging and professional identity on the one hand and peer networks on the other hand: instead of an *influence* of peer networks on belonging and professional identity, it might be the case that belonging and professional identity play a role in students' *selection* of friends and helpers. Research on belonging and professional identity in HE has however not yet adopted a longitudinal social network approach to account for this alternative explanation. The sixth chapter therefore aims to extend the current understanding of the link between peer relationships in HE and belonging and professional identity by adopting a longitudinal social network design.

Lastly, in **Chapter 7**, the main findings of the five empirical subprojects are summarised and discussed in relation to the two main objectives of this dissertation. This chapter also discusses strengths and weakness of the empirical studies, suggests directions for future research, and provides implications for educational practice.

Table 1. Overview of empirical chapters included in this dissertation

	Chapter 2	Chapter 3	Chapter 4	Chapter 5	Chapter 6
Topic	Score differences and differential prediction of various HE admissions instruments for groups of students with various migration backgrounds	The effectiveness of a pre-academic programme to support FGHE and CGHE students at the transition to HE	The role of student background characteristics and sense of belonging in the formation of peer networks	Predictors (background characteristics and sense of belonging) and outcomes (achievement, commitment) of professional identity	The mutual and dynamic development of sense of belonging, professional identity, and peer networks
Design	Case study	Quasi experimental pre-test post-test study	Longitudinal social network study	Two-wave questionnaire study	Longitudinal social network study
Outcome measures	<ul style="list-style-type: none"> - Admission test scores - Grade performance - Student population diversity 	<ul style="list-style-type: none"> - Academic self-efficacy - Sense of belonging - Grade performance - Peer and faculty social capital 	<ul style="list-style-type: none"> - Embeddedness in peer networks (friendship, help-seeking) - Segregation of peer networks 	<ul style="list-style-type: none"> - Professional identity - Grade performance - Course programme commitment 	<ul style="list-style-type: none"> - Sense of belonging - Professional identity - Peer networks
Data sources	<ul style="list-style-type: none"> - Admissions tests - Erasmus Educational Research (EER) database 	<ul style="list-style-type: none"> - Survey - EER database 	<ul style="list-style-type: none"> - Survey - Social networks - EER database 	<ul style="list-style-type: none"> - Survey - EER database 	<ul style="list-style-type: none"> - Survey - Social networks - EER database
Data analysis	T-tests; hierarchical step-down regression analysis	Multilevel regression; analysis of variance (ANOVA); path analysis	Stochastic actor-oriented modelling (SAOM)	T-tests; multivariate regression; ANOVA	Random-intercept cross-lagged panel models (RI-CLPM), SAOM
Context and participants	First year psychology students	First year university students	First year psychology students	First year law students	First year psychology students
Transition stage	Preparation	Encounter	Encounter/adjustment	Encounter/adjustment	Encounter/adjustment



Chapter 2

Ethnic-based score differences and differential prediction of various cognitive and noncognitive admissions instruments in higher education²

2 This chapter has been published as:

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Abstract

Selective admissions in higher education based on preuniversity grade point average (pu-GPA) can disadvantage ethnic minority students' admission chances. In this study, assessments of motivation and a curriculum-sample test (CST) were compared with pu-GPA by evaluating their effectiveness in mitigating ethnic-based score differences while maintaining predictive validity over course grades. Data obtained from students (N = 306) in a high-stakes admissions context were used. The motivation assessments and CST revealed no ethnic-based score differences. Pu-GPA and the CST were found to be positive predictors of the achievement of ethnic majority and ethnic minority students. The motivation assessments were poorly related to achievement. We conclude that CSTs show promise as a method for reducing ethnic-based score differences in admissions procedures while maintaining predictive validity.

Introduction

In response to high numbers of applicants and limited availability of enrolment slots, higher education institutions (HEIs) implement selective admissions procedures. With these procedures, HEIs often aim to admit well-performing and diverse student populations, contribute to equitable opportunities in education, and better equip students to serve increasingly diverse societies (Bowman, 2010; Gurin, 2002). Reaching this aim, however, remains a challenge. For instance, in the Netherlands, where the current study is conducted, research indicates that ethnic minority students, defined as students with at least one parent born outside of the Netherlands, have a lower chance of admission into selective programmes (Mulder et al., 2023; Stegers-Jager, 2018). Contributing to this disparity is the common practice of selecting students based on their pre-university academic achievement, which is typically measured by their pre-university grade point average (pu-GPA). Although pu-GPA is highly predictive of student achievement in higher education (HE), it also reduces the selection probabilities for ethnic minority students (Richardson et al., 2012; Rosinger et al., 2021; Stegers-Jager et al., 2015).

Admission decisions of HEIs are mostly not only based on pre-university grades, however. Typically, composite scores are used that combine grades with other types of admissions instruments, such as knowledge tests and assessments of motivation (Fikrat-Wevers et al., 2023; Kurysheva et al., 2019). In the Dutch HE context, 70% of selective HE course programmes use assessments of motivation to select students, and approximately 30% of selective programmes select students on the basis of content-specific exams (Dutch Inspectorate of Education, 2023). The use of these instruments could improve ethnic minority students' selection probabilities, as these instruments may exhibit smaller ethnic-based score differences as compared to pu-GPA (Bradburn & Schmitt, 2019; Ployhart & Holtz, 2008). Combining pu-GPA with different non-grade admissions instruments has therefore been suggested to attract a diverse student population in HE.

Given the high stakes involved in the decisions made in selective admissions, it is important to consider not only how non-grade admissions instruments affect ethnic-based score differences, but also whether these instruments meet other requirements of predictive validity and fairness. Predictive validity usually refers to the relation between test scores and relevant outcomes, such as academic performance (Berry, 2015). What constitutes fairness in selective admissions is contested, but there is consensus that absence of differential prediction is a key requirement (Zwick, 2019). Differential prediction refers to differences between subgroups in regression equations predicting outcomes from admission test scores, which is indicated by differences in regression slopes and/or intercepts (Berry, 2015). Differential prediction is considered particularly problematic when the performance of underrepresented groups is underpredicted (Kennet-Cohen et al., 2014; Shewach et al., 2017).

Despite the wide use of instruments such as assessments of motivation and knowledge tests in the selective admissions practice in HE, research on these types of instruments lags behind research on pu-GPA. In particular, it is unclear how these instruments perform on the aforementioned key indicators of validity and fairness, and specifically differential prediction. For motivation assessments, questions on predictive validity and differential prediction have been addressed, but mostly within low-stakes contexts that are difficult to compare with high-stakes admissions contexts (Isik et al., 2018; Niessen & Meijer, 2017). To assess whether these instruments have the potential to lower ethnic-based score differences caused by pu-GPA while maintaining good predictive validity, it is important to evaluate them in an actual high-stakes admissions context. In the current study, we used high-stakes admissions data obtained from a HE selective admissions procedure that utilised a composite score consisting of pu-GPA, assessments of motivation, and a curriculum-sample test (CST), and we examined how these instruments perform in terms of ethnic-based score differences, predictive validity, and differential prediction.

Assessment of Motivation

Assessments of motivation belong to a broader category of noncognitive admissions instruments that have been proposed to reduce ethnic-based score differences. The idea behind this approach is that the negative effect of pu-GPA on ethnic minority students' selection probabilities may be reduced by adding noncognitive predictors to a composite score, because smaller ethnic sub-group differences are typically found on these predictors (Hough et al., 2001; Schmitt et al., 2009). Research on assessments of motivation remains inconclusive on the question whether this instrument causes ethnic-based score differences. In low-stakes contexts, there are no clear indications of differences in motivation between ethnic groups (Isik et al., 2018), and some studies even suggest that ethnic minority students are more motivated (Hill & Wang, 2015). This might imply that, compared with pu-GPA, motivational assessments show smaller ethnic-based score differences and thus improve ethnic minority students' selection probabilities. By contrast, in high-stakes selection contexts, score differences between ethnic groups may arise, as students from majority groups generally have more access to support when completing assessments of motivation. This may be the case especially when motivation is assessed by personal statements (Woo et al., 2023; Zamanzadeh et al., 2020).

Regarding predictive validity, studies have found that noncognitive predictors, such as motivation, are valuable in predicting academic success and offer incremental value over prior academic performance (Credé & Kuncel, 2008; Richardson et al., 2012; Schmitt et al., 2009). Noncognitive predictors are for instance indicative of the extent to which students' motives and interests fit their programme of choice, which contributes to academic achievement (Soppe et al., 2024). However, the conclusions of these studies are generally based on data collected in low-stakes contexts, with low ecological validity to high-stakes selection contexts

(de Boer & van Rijnsoever, 2022). Accurate evaluation of motivation in high-stakes selection contexts is highly challenging and prone to faking, which possibly lowers the predictive validity of assessments of motivation (Niessen & Meijer, 2017; Peterson et al., 2011). Furthermore, regarding differential prediction, research suggests that the relationship between motivation and academic performance may vary between ethnic majority and ethnic minority students. Specifically, the academic performance of ethnic majority students may be better predicted by motivation than the performance of ethnic minority students (Isik et al., 2017). These results highlight a need to examine ethnic-based score differences, predictive validity, and differential prediction of motivation assessments in a high-stakes admissions context.

Curriculum-Sample Tests

A second instrument that HEIs increasingly use alongside pu-GPA to select students is the CST. In CSTs, applicants perform tasks similar to those in their future study programme. For example, they study domain-specific materials and take an exam (Lievens & Coetsier, 2002; Niessen et al., 2016). The rationale behind this approach is that, following the theory of behavioural consistency (Wernimont & Campbell, 1968), a representative sample of the study programme taps into the same cognitive and noncognitive factors that are necessary for achievement within the actual study programme (Niessen et al., 2016).

Multiple studies have found that CSTs can accurately predict academic performance in terms of grades and study progress (de Visser et al., 2018; Niessen et al., 2016; Reibnegger et al., 2010). It has also been suggested that curriculum sampling could help to reduce differential prediction by gender in high-stakes admissions contexts (Niessen et al., 2019). Less research has been conducted on performance differences and differential prediction of CSTs by ethnicity. A recent study in medical education revealed that ethnic minority students scored significantly lower on the CST compared with ethnic majority students (Fikrat-Wevers et al., 2023). Additional research is needed to examine the generalisability of these findings, particularly given the domain-specificity of CSTs. Furthermore, research has, to our knowledge, not yet examined ethnic-based differential prediction of CSTs.

The Current Study

In this study, we aim to contribute to existing literature on the validity and fairness of instruments that are used in HE selective admissions procedures. To this end, we examine several instruments, namely pu-GPA, assessments of motivation, and a CST, that were used in the context of a high-stakes admissions procedure of a psychology programme in the Netherlands. The combined use of these different types of admissions instruments in a single admissions procedure provides a unique opportunity to evaluate and compare these instruments on various key indicators of validity and fairness. We aim to do this by addressing

three research questions. Firstly, we ask whether, and to what extent, there are ethnic-based score differences on the admission instruments pu-GPA, assessments of motivation, and the CST, and to what extent the combined usage of these instruments affects the ethnic diversity of a student population. Secondly, we ask to what extent pu-GPA, assessments of motivation, and the CST are valid predictors of students' academic performance, measured by course grades in HE. Thirdly, we ask to what extent these admissions instruments show ethnic-based differential prediction of students' course grades.

Method

Procedure and Sample

Data were collected in 2020 at an undergraduate psychology programme of a research university in an urban area of the Netherlands. Since that year, applicants to the programme have been required to complete an admission assessment, consisting of four components: pu-GPA, a CST, strength of motivation for studying psychology (PSY-motivation), and study motivation. Applicants completed the CST and the motivation assessments via an online tool that could be filled out at any location. Applicants prepared for the CST by reading chapters and watching video lectures. The assessment took approximately 7 hours to complete, including 5 hours of preparation. In total, 1,361 applicants completed the assessment. Applicants' scores on the four separate components were z-transformed and combined into a composite score with each component weighted at 25%.

The composite score was used to allocate 600 available enrolment slots. Eventually, 562 students enrolled in the study programme, because not all admitted applicants accepted their invitation to enrol. International students were excluded from the analyses, because our study concerns differences between Dutch ethnic majority and ethnic minority students. The sample used for our analyses included 306 first-year students ($M_{age} = 19.45$, $SD_{age} = 2.40$, 83.4% female) who applied for the undergraduate psychology programme in 2020 and enrolled in the programme in the 2020–2021 academic year.

We obtained achievement data (i.e., course grade and study progress) and student background data through the university's educational research database and linked that information to admissions procedure data by using student identification numbers. The procedures of this study were approved by the department's ethical committee (reference number 21-019).

Measures

Pre-university Academic Achievement

Pre-university academic achievement was operationalised as pu-GPA. Applicants were asked to submit their grades for either the penultimate year of prior education or the last year if that year had already been completed. Most students (i.e., approximately 70%) submitted grades from their fifth year in secondary education, as most students enrol in the Dutch-language psychology programme after finishing pre-university education, which is a six-year educational track.

Assessments of Motivation

The assessment of applicants' PSY-motivation consisted of three parts. First, applicants had to write short personal statements with a maximum of 150 words to answer two open questions: 'Why do you want to study psychology?' and 'Why do you want to study psychology at our university?' Second, applicants were asked which activities they had undertaken to obtain information about the psychology programme (e.g., visiting the open day or reading the brochure of the programme) and which extracurricular activities made them a good match for the programme (e.g., a side job or voluntary work). Third, applicants filled in a questionnaire aimed to measure their strength of motivation to study psychology. The 15-item questionnaire was developed and used in the medical education context and was found to be a reliable and valid instrument to measure strength of motivation for this specific field of study (Nieuwhof et al., 2004; Wouters et al., 2016). Items were adapted to the psychology context. An example item is 'I would always regret not attempting to study psychology.' Answer categories for all questions ranged from 1 (completely disagree) to 5 (completely agree). The 15-item questionnaire had an estimated reliability of $\alpha = .75$. The PSY-motivation sub-assessments were weighted as follows: personal statements (40%), attended activities (40%), questionnaire (20%).

Study motivation was assessed via a 12-item questionnaire that was developed in the medical education context to measure autonomous and controlled study motivation (Wouters et al., 2016). An example item is 'I will participate actively in the psychology courses because I feel like it is a good way to improve my understanding of the material.' Applicants indicated the extent to which the statements applied to them on a 7-point scale (1 = not true at all; 7 = very true). The estimated reliability of the scale was $\alpha = .60$.

Curriculum-Sample Test

The CST was designed to realistically represent the first part of the undergraduate programme in psychology. The materials provided to students by the HEI were therefore at an undergraduate year-1 level, and the online lectures were provided by the psychology programme's lecturers, who also developed the exam questions. For each of the three subjects (personality, biological, and clinical psychology), five multiple-choice questions were included in the CST, each with four answer options. Two questions about the subject of clinical psychology involved performing statistical calculations, with the aim of also representing the methods and statistics component of the psychology programme. The CST's estimated reliability was $\alpha = .44$, signifying low reliability since an alpha score of .70 is typically the minimum required to indicate adequate reliability (Nunnally & Bernstein, 1994). This low reliability can be explained by the heterogeneous content of the test (Lievens & Coetsier, 2002), which included questions concerning three subfields of psychology and statistics, and by the low number of items that were included in the CST. Given the heterogeneous content of the test, test-retest reliability would provide a better estimate of the CST's reliability; however, this was not possible due to the absence of repeated measures. As an approximation of test-retest reliability, we computed a coefficient of split-half reliability by using the Spearman-Brown formula (for an explanation, see Eisinga et al., 2013). This led to a reliability coefficient of .51. Given the alignment of the CST with the content coverage and learning objectives of the psychology programme, we assume the CST to be a valid indicator of applicants' content knowledge after they studied the materials provided to them.

Academic Success

Academic success, the outcome or criterion measure of this study, was defined as achievement (i.e., grades) and study progress (i.e., credits).

Academic achievement was measured by first-course grade and first-year grade point average (FYGPA). Grades for separate courses were given on a scale from 1 (lowest) to 10 (highest), but only grades above 4 were registered in the university's educational research database. First-course grade is the final grade (i.e., the grade after possible resits) that students received for the first course in the psychology programme, an introductory course in social psychology. In this course, 97.1% of the students obtained a grade of 4.0 or higher. FYGPA was calculated as the average of the final grades for all courses, weighted by the credit hours (ECTS) assigned to these courses. We did so for all students who had obtained at least one grade for a first-year psychology course (cf. Kickert et al., 2021).

Study progress of the first year was operationalised as obtaining the required number of credits (ECTS) to enrol in year 2 of the psychology programme. For cohorts 2018 and 2019 (which were included in our study to analyse potential inequalities based on the 2020 selective admissions

procedure), this meant a total of 60 (out of 60) ECTS. For the 2020 cohort, the programme management decided, because of the COVID-19 pandemic, students had to obtain 52.5 ECTS to enrol in year 2. First-year study progress was a binary variable (successful/not successful).

Ethnic Background

We retrieved ethnic background data from the university's educational research database. The distinction between ethnic majority and ethnic minority students was based on the definition used by Statistics Netherlands (CBS). According to this definition, an individual belongs to an ethnic minority group if at least one parent was born outside the Netherlands. Based on their parents' countries of birth, ethnic minority students were classified as having a non-Western background, including primarily a Moroccan, Surinam, Turkish, or Antillean background. Research has shown that non-Western ethnic minority students in particular experience disadvantages in HE, compared to Western ethnic majority (Dutch) students and other Western ethnic minority students (e.g., from Western European countries) (Stegers-Jager et al., 2015). To answer our research questions and due to the limited number of students with a Western minority background ($n = 39$), we decided to exclude those students from the analyses.

Analyses

Predictive Validity

Predictive validity refers to the extent to which predictors and outcome(s) correlate with each other. We assessed this by calculating the Pearson correlations of predictors and outcomes, both uncorrected and corrected for restriction of range. In selection research, restriction of range is a common problem in analyses, because of (educational) organisations' preference for high-ability applicants implies that admitted applicants have a higher ability and are more similar in ability than the complete applicant group (Dahlke et al., 2019). In the current study, students were selected on an operational composite of the various predictors, leading to indirect range restriction on each individual predictor, which leads to an underestimation of the validity of the admissions instruments (Sackett & Yang, 2000; Zimmermann et al., 2017). Estimates of the predictive validity of the separate predictors were therefore corrected for range restriction by using the Pearson-Lawley multivariate correction method (Lawley, 1944). Estimates of the predictive validity of the composite score used for selection were corrected by using Thorndike's case 2 correction formula for direct range restriction, as direct selection occurred on this composite score (Thorndike, 1949).

Ethnic-Based Score Differences

To assess differences between groups from different ethnic backgrounds on the predictors, we adopted two complementary approaches. First, we calculated sub-score differences between ethnic majority and ethnic minority students on the predictors and the final composite, tested them for significance with t-tests, and expressed them in terms of Cohen's *d* effect sizes. Ethnic background information was only available for students who had enrolled in the programme, not for applicants who had not enrolled, leading to restriction of range in this analysis. Therefore, to avoid underestimation of sub-score group differences, we calculated *d*-values based on the range restriction corrected correlation matrix (Wiernik & Dahlke, 2020). Second, we examined ethnic-based score differences at a student population level by comparing the ethnic diversity of the 2020-cohort, who had enrolled with selective admissions, with the ethnic diversity of the 2018- and 2019-cohorts, who had enrolled in the same study programme through open admissions.

Differential Prediction

Differential prediction refers to differences in regression equations of predictors on outcomes between subgroups (Berry, 2015). To examine differential prediction, we used the Cleary model of test bias (Cleary, 1968) by conducting step-down hierarchical regression analyses (Aguinis et al., 2010; Lautenschlager & Mendoza, 1986). In line with this procedure, we first estimated three regression models for each combination of predictor and outcome: Model 1 included only the predictor; Model 2 included the predictor and the categorical ethnicity variable; and Model 3 included the predictor, ethnicity, and the interaction between the predictor and ethnicity. Then, to formally assess whether differential prediction existed, we conducted an omnibus test to compare Models 1 and 3. If Model 3 showed incremental explained variance over Model 1 ($\Delta R^2_{\text{Omnibus}}$), then evidence of differential prediction existed. In the next step, we tested whether the differential prediction was due to differences between slopes, intercepts, or both. We examined slope differences by comparing Model 3 against Model 2. Here, increased explained variance ($\Delta R^2_{\text{slope}}$) indicated slope differences between ethnic groups. Lastly, we assessed intercept difference by comparing Model 2 against Model 1, with increased explained variance ($\Delta R^2_{\text{intercept}}$) indicating intercept differences between ethnic groups.

Before conducting regression analyses, we applied corrections for range restriction to covariance matrices including the predictors, outcomes, ethnic group variable, and interaction variables (predictor*ethnicity). These covariance matrices were used as input for the regression analyses. The observed sample size ($n = 306$) was used to evaluate the significance tests for the Cleary test analyses.

We further analysed potential slope and intercept differences to determine whether over- or underprediction occurred for the minority group relative to the majority group. In addition to

examination of regression coefficients and ΔR^2 , we calculated categorical moderation (d_{Mod}) effect sizes to quantify the magnitude of over- or underprediction (Dahlke & Sackett, 2018; Nye & Sackett, 2017). The following d_{Mod} effect sizes were computed: d_{Mod_Signed} (signed effect size for differential prediction, with positive values when ethnic minority students' performance was overpredicted and negative values when ethnic minority students' performance was underpredicted), $d_{Mod_Unsigned}$ (unsigned effect size for differential prediction, regardless of whether it took the form of over- or underprediction), d_{Mod_Under} (standardised difference in the score range where underprediction for ethnic minority students occurred), and d_{Mod_Over} (standardised difference in the score range where overprediction for ethnic minority students occurred). The d_{Mod} effect sizes can be interpreted similarly to Cohen's d . The *psychmeta* package in R was used to compute the effect sizes.

Results

Table 1 presents descriptive statistics and correlations of this study's variables, including the four predictors (pu-GPA, the CST, PSY-motivation, study motivation), the composite score, the ethnic grouping variable, and the outcome variables first-course grade and first-year GPA. The PSY-motivation and composite scores were both constructed from z-scores and thus have means around zero. For the four predictors and the composite score, the mean and standard deviation of both the selected sample (i.e., students enrolled in the course programme; restricted sample) and the applicant sample (unrestricted sample) are presented together with the predictors' u -ratios (restricted predictor SD divided by unrestricted predictor SD), indicating the amount of range restriction of these predictors.

Table 1. Descriptive statistics and intercorrelations among study variables.

	Restricted sample		Unrestricted sample		u-ratio	1	2	3	4	5	6	7
	M	SD	M	SD								
<i>Predictors</i>												
1. pu-GPA	6.82	0.47	6.75	0.52	.91	-						
2. Curriculum-sample	12.80	1.42	12.16	1.83	.78	.08	-					
3. PSY-motivation	0.00	0.46	0.02	0.52	.89	-.03	.04	-				
4. Study motivation	5.12	0.49	4.97	0.55	.91	-.17***	-.22***	-.13*	-			
5. Final composite	0.00	0.44	-0.06	0.53	.84	.50***	.51***	.50***	.27***	-		
<i>Background</i>												
6. Ethnicity ^a	-	-	-	-	-	-.17**	-.08	.11	.05	-.07	-	-
Range restriction correction ^b						-.19	-.11	.07	-.02	-.09		
<i>Outcomes</i>												
7. First-course grade	7.10	1.15	-	-	-	.23***	.26***	.10	-.12*	.26***	-.07	-
Range restriction correction ^b						.29	.36	.20	-.02	.31		
8. First-year GPA	6.98	0.74	-	-	-	.44***	.23***	.09	-.11*	.36***	-.20**	.68***
Range restriction correction ^b						.50	.36	.22	.01	.43		

^a Ethnic majority students are coded as value 0; ethnic minority students as value 1.

^b Correlations between predictors and background/outcome variables are corrected for multivariate indirect range restriction (Pearson-Lawley). Correlations between the final composite score and background/outcome variables are corrected for direct range restriction (Thorndike Case II). Statistical significance was determined prior to range restriction corrections.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Predictive Validity

We used the correlations between predictors and outcomes in Table 1 to examine predictive validity. As listed in this table, we found moderate positive and significant ($p < .001$) correlations between pu-GPA on the one hand and first-course grade and FYGPA on the other, with r -coefficients corrected for range restriction of .29 (first-course grade) and .50 (first-year GPA), implying that students who earned higher grades in pre-university education also obtained higher grades in their first year of HE. Among the various predictors, pu-GPA was the strongest predictor of FYGPA. Table 1 further shows significant ($p < .001$) positive (corrected for range restriction) correlations between the CST on the one hand and first-course grade ($r = .36$) and FYGPA ($r = .36$) on the other. The third predictor, PSY-motivation, revealed positive but non-significant correlations between the two outcome variables, although r -coefficients increased to values of .20 (first-course grade) and .22 (FYGPA) after range restriction corrections were applied to the correlation matrix. For the fourth predictor, study motivation, Table 1 indicates significant ($p < .05$) negative correlations of $r = -.12$ for first-course grade and $r = -.11$ for FYGPA. However, the two corrected correlations were around zero, indicating no association between study motivation and the two outcomes.

Lastly, regarding the composite score, Table 1 shows positive and significant ($p < .001$) corrected correlations of $r = .31$ for first-course grade and $r = .43$ for FYGPA. Students with higher scores in the admissions procedure thus performed better during their first year in HE. Furthermore, according to the results in Table 1, the CST has stronger predictive validity for first-course grade than the composite score, and pu-GPA has stronger predictive validity for FYGPA than the composite score.

Ethnic-Based Score Differences

Tables 2 and 3 display the results of the analyses to examine score differences on the predictors and enrolment differences between ethnic majority and minority students. In Table 2, the mean scores on the predictors and the composite score are presented for both student groups. Results of the independent sample t-tests including corrected and uncorrected effect sizes (Cohen's d) are also presented in Table 2. Range restriction corrected d -values are calculated based on the corrected correlation coefficients of the predictors with the ethnic grouping variable in Table 1 (Wiernik & Dahlke, 2020).

Table 2 Means and standard deviations of admission exam tests and scores for ethnic majority and ethnic minority students (2020-sample)

Predictor	Ethnic majority students (<i>n</i> = 225)		Ethnic minority students (<i>n</i> = 81)		t-value	Observed <i>d</i> -value	Corrected <i>d</i> -value
	M	SD	M	SD			
pu-GPA	6.87	0.45	6.69	0.50	2.91**	0.40	0.44
CST	12.87	1.47	12.61	1.36	1.47	0.18	0.25
PSY-motivation	-0.03	0.48	0.08	0.37	-2.16*	-0.25	-0.16
Study motivation	5.00	0.49	5.11	0.50	-0.15	-0.02	-0.05
Composite	0.02	0.47	-0.05	0.36	1.43	0.17	0.20

Note. Positive effect sizes reflect differences favouring ethnic majority students, negative effect sizes reflect differences favouring ethnic minority students.

* $p < .05$; ** < 0.01 ; *** < 0.001 .

Table 2 shows that ethnic majority students scored higher on pu-GPA ($M = 6.87$, $SD = 0.45$) than ethnic minority students ($M = 6.69$, $SD = 0.50$). This difference is significant, $t(129) = 2.91$, $p = .004$, with a medium corrected effect size of .44. Ethnic majority students scored similarly to ethnic minority students on the CST ($M = 12.87$, $SD = 1.47$ and $M = 12.61$, $SD = 1.36$, respectively), although there was a slight nonsignificant difference, $t(151) = 1.47$, $p = .145$, with an observed effect size of $d = .18$. After we corrected for range restriction, the effect size increased to $d = .25$. Although still low in value, this effect size indicated that there may have been small ethnic-based group differences in the complete unrestricted applicant sample on the CST. On the third and fourth predictors, PSY-motivation and study motivation, no differences were observed – scores were somewhat higher but corrected effects sizes were low ($d = -.16$ for PSY-motivation and $d = -.05$ for study motivation). Lastly, according to Table 2 scores on the composite measure used for selection were similar for ethnic majority students ($M = .02$, $SD = .47$) and ethnic minority students ($M = -.05$, $SD = .36$); the observed difference was not significant and a low corrected effect size of $d = .20$ was found.

To examine the effect of the selection procedure on the student population's ethnic diversity, we analysed two cohorts enrolled without selective admissions (cohorts 2018 and 2019) and one cohort enrolled with selective admissions (cohort 2020). Table 3 displays the ethnic composition of these cohorts both at the start and at the end of the first year. This table indicates that at the start of the 2020 academic year, 26.47% of the students who had enrolled in the psychology programme had an ethnic minority background, as compared to 30.57% in 2018 and 30.80% in 2019. The percentage of ethnic minority students was thus lower in the cohort that had enrolled with selective admissions as compared to the cohort that had enrolled without selective admissions. However, the percentage of ethnic minority students who had successfully completed the first year relative to ethnic majority students in the selective 2020 cohort (24.06%) was similar to that of the nonselective 2018 and 2019 cohorts (21.16% and 23.97%, respectively).

Table 3 Ethnic group composition of cohorts with and without selective enrolment

	2018-sample (non-selective)		2019-sample (non-selective)		2020-sample (selective)	
	N	%	N	%	N	%
<i>Enrolled (start year 1)</i>						
Ethnic majority students	343	69.43	492	69.20	225	73.53
Ethnic minority students	151	30.57	219	30.80	81	26.47
Total	494		711		306	
<i>Successful completion (end year 1)</i>						
Ethnic majority students	190	78.88	314	76.03	199	75.95
Ethnic minority students	51	21.16	99	23.97	63	24.06
Total	241		413		262	

Differential Prediction

Table 4 lists the results for the step-down regression analyses that we used to detect differential prediction. Corresponding d_{Mod} effect sizes are presented in Table 5. Analyses of the four individual predictors were performed using covariance matrices corrected for multivariate indirect range restriction by applying the Pearson–Lawley correction formula. The analysis of the composite score made use of a covariance matrix that was corrected for direct range restriction via the Thorndike Case 2 correction formula. Figure 1 depicts the regression lines for ethnic majority and ethnic minority students.

Table 4. Regression analyses of selection predictors on first-year GPA and first-course grade.

Note. Standard errors are between brackets.

Outcomes		Individual predictors				Composite
		pu_GPA	Curriculum-sample	Psy-motivation	Study motivation	
First-year GPA	<i>Model 1</i>					
	Predictor	.76 (.08)***	.15 (.02)***	.33 (.09)***	.02 (.08)	.69 (.09)***
	R ²	.252	.126	.047	.000	.173
	<i>Model 2</i>					
	Predictor	.73 (.08)***	.14 (.02)***	.36 (.08)***	.02 (.08)	.67 (.09)***
	Ethnicity ^a	-.22 (.09)*	-.31 (.09)***	-.41 (.10)***	-.38 (.10)***	-.27 (.09)**
	R ²	.267	.158	.100	.046	.199
	<i>Model 3</i>					
	Predictor	.78 (.09)***	.16 (.03)***	.40 (.09)***	.03 (.09)	.72 (.10)***
	Ethnicity ^a	-.23 (.09)*	-.32 (.09)***	-.38 (.10)***	-.38 (.09)***	-.28 (.09)**
	Interaction	-.16 (.18)	-.05 (.07)	-.31 (.24)	-.04 (.20)	-.25 (.23)
	R ²	.269	.159	.105	.046	.203

Table 4. Regression analyses of selection predictors on first-year GPA and first-course grade.
 Note. Standard errors are between brackets. (continued)

Outcomes	Individual predictors				Composite
	pu_GPA	Curriculum- sample	Psy- motivation	Study motivation	
<i>Step-down comparison</i>					
ΔR^2	.017*	.033**	.058***	.046***	.030**
Omnibus					
ΔR^2 Slope	.002	.001	.005	.000	.004
ΔR^2	.015*	.032***	.053***	.046***	.026**
Intercept					
First- course grade	ΔR^2				
	Intercept				
	Predictor	.66 (.13)***	.24 (.04)***	.47 (.13)***	-.05 (.12)
R^2	.084	.131	.041	.000	.094
<i>Step 2</i>					
Predictor	.65 (.13)***	.23 (.04)***	.48 (.13)***	-.05 (.12)	.78 (.14)***
Ethnicity ^a	-.10 (.15)	-.13 (.14)	-.28 (.15)	-.24 (.15)	-.12 (.14)
R^2	.085	.133	.051	.008	.096
<i>Step 3</i>					
Predictor	.80 (.16)***	.21 (.04)***	.61 (.14)***	-.03 (.07)	.87 (.16)***
Ethnicity ^a	-.14 (.15)	-.12 (.14)	-.22 (.15)	-.24 (.15)	-.13 (.14)
Interaction	.51 (.30)	.10 (.10)	-.77 (.38)*	-.06 (.30)	-.42 (.38)
R^2	.094	.136	.064	.008	.099
<i>Step-down comparison</i>					
ΔR^2	.010	.005	.023*	.008	.005
Omnibus					
ΔR^2 Slope	.009	.003	.013*	.000	.003
ΔR^2	.001	.002	.010	.008	.002
Intercept					

^a Ethnic majority students are coded as value 0; ethnic minority students as value 1.

* $<.05$; ** $<.01$; *** $<.001$.

Pre-university GPA. Differential prediction with an intercept difference was found in the model for FYGPA. This was indicated by the significant omnibus comparison and a significant intercept comparison (see Table 4). The non-significant slope comparison implies that slopes of regression lines were equal for ethnic majority and ethnic minority students. Note that the signed ($d_{Mod_signed} = .26$) and unsigned ($d_{Mod_unsigned} = .33$) effect sizes were close in value, which implies that effects did not cancel each other out due to slope differences (Nye & Sackett,

2017). Ethnicity coefficients were positive, meaning that performance of the ethnic minority group was overpredicted.

Corresponding effect sizes in Table 5 indicate that this overprediction was of small to moderate magnitude ($d_{Mod_over} = .30$). For the second outcome variable first-course grade no statistically significant differential prediction was found, as indicated by the non-significant omnibus test. Note however that the trends in Figure 1 suggest a slope difference that this study could not detect at the $\alpha = .05$ level due to lack of power.

Table 5. Effect sizes for differential prediction

Outcome	Predictor	d_{Mod_signed}	$d_{Mod_unsigned}$	d_{Mod_under}	d_{Mod_over}	Prop ^{Under}	Prop ^{Over}
First-year GPA	pu-GPA	.26	.33	-.04	.30	.22	.78
	Curriculum sample	.42	.42	.00	.42	.00	1.00
First- course grade	Psy-motivation	.57	.57	.00	.57	.00	1.00
	Study motivation	.53	.53	.00	.53	.00	1.00
	Composite	.39	.39	.00	.39	.00	1.00
	pu-GPA	.06	.18	-.06	.12	.38	.62
First- course grade	Curriculum sample	.12	.14	-.01	.13	.12	.89
	Psy-motivation	.24	.28	-.02	.26	.16	.84
	Study motivation	.21	.21	.00	.21	.00	1.00
	Composite	.13	.15	-.01	.14	.16	.84

Curriculum-sample test. A statistically significant intercept difference was found in the model for FYGPA in Table 4. The significant omnibus comparison firstly indicated differential prediction. The non-significant slope comparison and significant intercept comparison then indicated that this differential prediction was due to intercept difference and not slope difference. The signed and unsigned effect sizes being positive and equivalent ($d_{Mod_Signed} = .42$ and $d_{Mod_unsigned} = .42$) imply that the ethnic minority group's grades were overpredicted, and that this overprediction occurred over the full range of participants' CST scores, which is also visible in Figure 1. No differential prediction was found in the model for first-course grade, as indicated by the non-significant omnibus comparison and small effect sizes ($d_{Mod_Signed} = .12$ and $d_{Mod_unsigned} = .14$).

Motivation for studying psychology. Statistically significant differential prediction in terms of intercept difference was found in the model for FYGPA. This was indicated by a significant omnibus comparison, a non-significant slope comparison, and a significant intercept comparison. Positive and equivalent signed and unsigned effects sizes ($d_{Mod_Signed} = .53$ and $d_{Mod_unsigned} = .53$) signify that ethnic minority students' grades were overpredicted across the full range of scores. For first course grade, the models showed differential prediction in terms of slope difference, as indicated by a significant omnibus comparison, a significant slope comparison, and a non-significant intercept comparison. The interaction plot of PSY-motivation

in Figure 1 shows that PSY-motivation was predictive for ethnic majority students' first-course grades, but that it was not predictive for the grades of ethnic minority students.

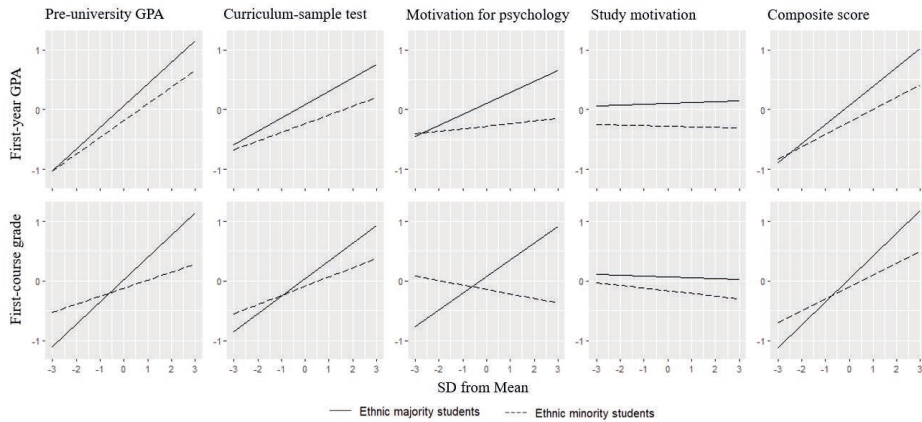


Figure 1. Expected FYGPA and First-course grade based on regression models presented in table 4.

Study motivation. As noted above, study motivation was not associated with FYGPA nor with first-course grade. Models in Table 4 further show that this was the case for both ethnic majority and ethnic minority students.

Composite. Differential prediction in terms of intercept difference was found in the FYGPA models, as indicated by the significant omnibus comparison, non-significant slope comparison, and significant intercept comparison in Table 4. Positive and equivalent signed and unsigned effects sizes ($d_{Mod_Signed} = .39$ and $d_{Mod_unsigned} = .39$) signify that ethnic minority students' grades were overpredicted across the full range of scores. This overprediction was of moderate magnitude and comparable to overprediction caused by the CST. For first course-grade, no statistically significant differential prediction was found, as indicated by the non-significant omnibus comparison. Note however that Figure 1 suggests a small slope difference between ethnic majority and ethnic minority students.

Discussion and Conclusion

Selective admissions in HE based on prior educational achievement decrease the probabilities of ethnic minority students to enrol in selective programmes (Fikrat-Wevers et al., 2023; Rosinger et al., 2021). Using admissions instruments other than grades has been suggested to attract a diverse student population in HE course programmes (Stegers-Jager et al., 2015). In practice, many HEIs already select their students based on a wide range of non-grades admissions instruments, but an empirical evaluation of the predictive validity and ethnic-based score differences is lacking (Bradburn & Schmitt, 2019; Niessen & Meijer, 2017). In

the present study, we examined whether assessments of motivation and CSTs, two types of instruments that are commonly used in HE selective admissions, show smaller ethnic-based score differences than grades do, and whether these instruments meet requirements regarding predictive validity and ethnic-based differential prediction. To fulfil these objectives, we analysed data obtained in a high-stakes HE admissions procedure that included various admissions instruments: prior academic achievement, a CST, and assessments of motivation for studying psychology and study motivation.

Our results showed that prior academic achievement was a good predictor of first-year academic success, but also that ethnic minority students' scores on this predictor were lower than those of ethnic majority students. These findings regarding pu-GPA's predictive validity and score differences by ethnic background are consistent with prior research (Rosinger et al., 2021; Stegers-Jager, 2018; Vulperhorst et al., 2018). Our results also support previous research on the strategy to reduce score differences between students from different ethnic backgrounds by adding noncognitive indicators alongside pu-GPA to a final composite score (Bradburn & Schmitt, 2019; Schmitt et al., 2009). Neither the PSY-motivation nor study motivation assessments showed score differences by ethnic background. This absence of score differences on the motivation assessments compensated for the score differences that we observed on pu-GPA in the final composite score, which did not show score differences between ethnic majority and ethnic minority students.

Our results further indicated small but non-significant score differences between ethnic majority and ethnic minority students on the CST. These results suggest that CSTs might be a viable alternative to pu-GPA to increase ethnic minority students' chances of admission into HE course programmes, as pu-GPA showed larger ethnic-based differences in scores. These results contrast with those of Fikrat-Wevers et al. (2023), who found that ethnic minority students scored significantly lower on a CST in the medical educational context. However, this effect was not present in all educational programmes included in their study. Given the prominent use of CSTs in admissions procedures, these contrasting findings suggests a need to study score differences on CSTs between ethnic groups in multiple contexts.

The results of the analyses of predictive validity and ethnic-based score differences highlighted a classic diversity-validity dilemma for the admissions instruments prior academic achievement and the assessments of motivation (Pyburn et al., 2008). Prior academic achievement is a valid predictor of academic success in terms of course grades but substantially lowers ethnic minorities admissions scores. Adding the motivation assessments to the final composite score reduced ethnic-based score differences but substantially decreased the predictive validity of the selection procedure. The results of the CST analyses indicate that this instrument may reduce ethnic-based score difference, while maintaining predictive validity. As such, the CST might offer an alternative to pu-GPA and noncognitive admissions instruments, such as assessments of motivation, as it had smaller negative effects on student population diversity than pu-GPA and showed better predictive validity than the assessments of motivation.

The result that motivation assessments are poor predictors of academic achievement is common in HE selection research (Niessen & Meijer, 2017; Woo et al., 2023). In particular, the study motivation questionnaire, one of the motivation assessments, performed poorly regarding predictive validity. A plausible explanation for this finding is that some applicants faked their answers, and their answers thus did not reflect their actual motivation to study in HE (Peterson et al., 2011). This may be especially true for applicants with relatively low pu-GPAs, who may attempt to compensate by presenting a high motivation. If questionnaires are used in high-stakes selection contexts, a possible solution to the problem of socially desirable responses might be to use questionnaires with a forced-choice design. Another possible explanation is the low internal consistency of the motivation questionnaire's scales, which is particularly concerning for a high-stakes selection procedure. Assessing motivation or other noncognitive indicators in a high-stakes selection context thus requires higher psychometric standards. Overall, our results restate the importance of researching admissions instruments in real, high-stakes selection contexts.

Regarding differential prediction, our results regarding the overprediction of ethnic minority students' course grades by pre-university grades is in line with prior research on differential prediction of grade-based selection (Kennet-Cohen et al., 2014; Shewach et al., 2017). Less research has been conducted on differential prediction of motivational instruments and CSTs, especially in high-stakes contexts. Nevertheless, our results suggest that, if differential prediction occurs on these instruments, it occurs in a similar direction as the observed differential prediction of pre-university grades, namely overprediction of ethnic minority students' course grades. Regarding the CST, prior research has shown that this instrument reduces gender-based differential prediction, in the sense of underprediction of female performance, arguably because the CST is proximal to actual performance in a HE course programme (Niessen et al., 2019). Important here, however, is that none of the instruments in our study showed underprediction of ethnic minority students' course grades. This is considered particularly problematic for HEIs' goals to widening access to HE, because regression lines would disadvantage the group that already has lower access to HE if they underpredict ethnic minority students' grades (Kennet-Cohen et al., 2014).

A limitation of our study was the omission of ethnic background data of applicants who had not enrolled in the study programme, because those data were only available for enrolled students in the university's education research database. Our analyses of ethnic-based score differences therefore relied on data from a sample of selected students. The negative consequences of calculating sub-score differences within the sample of enrolled students was partly mitigated, because many applicants who were eventually admitted in the programme, based on their assessment score, declined their invitation to enrol, with the lowest ranking number that was invited to enrol in one of the 600 slots being 975. This increased the range of admission-scores that could be linked to study outcomes. For future research, a recommendation is to use background data of the whole applicant sample, if available (Fikrat-Wevers et al., 2023; Stegers-Jager et al., 2015).

Another way in which we attempted to work around the data omission was by comparing ethnic diversity of the cohort enrolled with selective admissions with two prior cohorts enrolled without selective admissions. These analyses indicated decreased ethnic diversity in the selective admissions cohort. It should be noted however, that this decrease can only partly be explained by ethnic-based score differences on the admissions instruments. Prior research indicated that, compared with ethnic majority students, ethnic minority students apply for selective study programmes less often, because they estimate that their chances of success will be lower (i.e., self-selection; Freeman et al., 2016; Mulder et al., 2022b). To overcome this inequality of opportunity in HE due to selective admissions and to increase student population diversity, lottery-based selection has been suggested (Mulder, 2022).

A second limitation of our study is the low level of reliability of the CST, which can mostly be explained by (1) the heterogeneous content of the test, in which questions were included on three subfields of psychology and statistics, (2) the relatively low number of items included in the test. Although we believe that the content of the CST was of high quality, because of its alignment with the content and learning objectives of the first year of the study programme and its positive association with year-1 course grades, practitioners and researchers involved in developing CSTs should strive for more reliable tests, for instance by making the test longer.

A third limitation of our study is the relatively small size of our sample, particularly for detecting slope differences with small effect sizes in the differential prediction analyses. Although our decision to use data that were collected in an actual high-stakes selection context increased the external validity of our results, this also meant that we had to work with a sample whose size was determined based on the number of students that participated in the selection procedure and had enrolled into the course programme. Further research with large sample sizes and data collected in high-stakes contexts is therefore needed to confirm our findings.

A fourth limitation is that the generalisability of our findings may be limited because the 2020-sample had studied their first year in HE during the COVID-19 crisis, leading to drastic changes in both campus life and examination policies, which may have impacted students' academic achievement and the associated inequities between ethnic groups (Goudeau et al., 2021). Future research should investigate ethnic-based score differences and predictive validity of selective admissions in other study programmes and not under COVID restricted conditions. Future research should also include gender, socioeconomic background, or intersections between various social categories. Lastly, future research should investigate performance on the various admissions instruments of students who are the first in their family to study in HE (i.e., first-generation in HE students).

We conclude that admitting HE students based on a composite score which includes an assessment of motivation alongside prior academic achievement may mitigate ethnic-based score differences. However, these motivation assessments are poor predictors of academic success, especially compared to pu-GPA. Our study further demonstrates that CSTs, as

compared to pu-GPA, show promise in lowering ethnic-based score differences as compared to pu-GPA, while maintaining substantial predictive validity for both ethnic majority and ethnic minority students



Chapter 3

Supporting students' transition to higher education: the effects of a pre-academic programme on sense of belonging, academic self-efficacy, and academic achievement³

3 This chapter has been published as:

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Abstract

The transition to higher education is a challenging period for many students and requires support. Because students' backgrounds, such as being a first-generation in higher education student shape experiences in higher education, it is important to consider these factors when organising support. Using a quasi-experimental pre-test – post-test design, the current study examined the effects of an online pre-academic programme (PAP) specifically aimed to address background-related challenges, on early academic achievement, sense of belonging, academic self-efficacy, and mobilisation of on-campus social capital. Multilevel regression analyses of achievement data ($N_{\text{PAP}} = 463$; $N_{\text{Control}} = 948$) and psychosocial data ($N_{\text{PAP}} = 115$; $N_{\text{Control}} = 544$) indicated a positive effect of PAP on achievement and sense of belonging, but not on self-efficacy. Mediation analyses showed that effects of PAP did not vary according to background factors. Path analysis further showed a positive association of PAP participation and mobilisation of peer social capital, which partly mediated the effect on sense of belonging. No associations were found with mobilisation of faculty social capital. The results suggest that PAP participation positively affects students' transition to HE, in terms of early achievement, sense of belonging in HE, and mobilisation of peer capital.

Introduction

The transition to higher education (HE) is an important and challenging life event for students. High levels of first-year drop-out and well-being problems indicate that many incoming students experience severe difficulties during their first months in HE (Briggs et al., 2012; Coertjens et al., 2017). Challenges that first-year students encounter include, for instance, making sense of the new learning environment, establishing relationships with peers and faculty, and adjusting to new ways of learning (Brooman & Darwent, 2014). To support students with these challenges, many higher education institutions (HEIs) have implemented transition interventions (Coertjens et al., 2017). A particularly prevalent type of such an intervention is the pre-academic or summer-bridge programme: an intervention that occurs during summer before incoming students enrol into their first year in HE and that aims to facilitate students' first encounter with the HE environment (Sablan, 2014; van Herpen et al., 2020).

Although pre-academic programmes strongly vary in aims and activities, it is common that these programmes primarily include modules on study skills, time management, and campus organisation (Greer et al., 2023; Sablan, 2014). This focus on academic skills and practical information may not sufficiently support all students however, as this strategy does not explicitly acknowledge the way in which social background influences experiences and challenges of students (Melguizo et al., 2021; Schwartz et al., 2018). Research indicates for instance that first-generation in higher education students (FGHE-students) experience more and additional difficulties during the transition to HE, such as feeling less welcomed and having more doubts about their belonging in HE, than continuing-generation in higher education students (CGHE-students; Leese, 2010; Spiegler & Bednarek, 2013). Interventions that do not take these background-specific experiences into account may not succeed to offer inclusive support, in the sense that they do not meet the needs of all incoming students (Hausmann et al., 2009; Townsend et al., 2021). To facilitate both FGHE and CGHE students' transition to HE, it is thus important that pre-academic programmes adopt strategies that address these specific background-related experiences.

Two strategies that transition programmes can adopt for inclusive support are 1) acknowledging and teaching participants how students' identities influence experiences in HE, and 2) enhancing mobilisation of on-campus social capital. Prior studies have shown a potential of these strategies to partly bridge an achievement gap identified for several decades in the US between FGHE- and CGHE-students, by improving FGHE-students' grades (Schwartz et al., 2018; Stephens et al., 2014; Terenzini et al., 1996). In Dutch HE, the context of the current study, this achievement gap is less pronounced (van Rooij et al., 2018), but there are indications that FGHE-students experience more doubts about their academic abilities and belonging in HE (Hulzebos & Munniksmas, 2022). These findings, and an increasing call to define success in HE more broadly than merely academic outcomes, including for instance psychosocial outcomes such as sense of belonging and academic self-efficacy (Melguizo et al., 2021; van der Zanden

et al., 2018), suggest a need to implement and study interventions that aim to impact these transition outcomes as well.

In the current study, the effectiveness of an online pre-academic programme (PAP) is examined. This programme aims to support all transitioning students, but adopts specific strategies to address experiences of FGHE-students, based on theories and prior research on multicultural education (Denson, 2009; Gurin et al., 2002) and social capital (Parnes et al., 2020; Schwartz et al., 2018). Using a quasi-experimental pre-test post-test design, we examined the effects of PAP on various transition outcomes (academic achievement, sense of belonging, academic self-efficacy).

The transition to higher education

The relevance of the transition to HE for students' further academic trajectories and its' challenging nature are widely emphasised in the HE literature (Briggs et al., 2012; Coertjens et al., 2017). Based on Nicholson's (1990) transition cycle model, the transition is often conceptualised as a process of change and instability consisting of four stages: preparation, encounter, adjustment, and stabilisation. In the preparation stage, students prepare for enrolment by orientating on HE course programmes and choose where to enrol. The encounter stage then occurs during the first weeks in HE. In this stage, students have their first confrontation with the new learning environment and academic culture and try to make sense of it. In the adjustment stage, students attempt to cope with the new environment and gradually adjust their behaviours to succeed. This stage occurs approximately until the end of students' first year in HE. Then, ideally speaking, stabilisation occurs, which is a more stable period in which students make only small adjustments to their behaviour. Within the transition cycle, the encounter stage has been identified as a particular vulnerable time that requires support for students (Coertjens et al., 2017; de Clercq et al., 2022).

Transition outcomes

From the literature, a few outcomes can be identified that indicate success of transitioning students during the transition to HE. Firstly, research repeatedly shows the importance of academic self-efficacy (Brooman & Darwent, 2014; de Clercq et al., 2022), referring to students' perception of their ability to learn and perform in the educational context (Bandura, 1997). Academic self-efficacy is strongly related to academic achievement (Richardson et al., 2012; Robbins et al., 2004) and could contribute to the resilience of transitioning students to cope with the potentially stressful and demanding changes (Kyndt et al., 2019).

A second requirement for a successful encounter is the development of a sense of belonging in HE, referring to a feeling of connectedness with the HE community, that one is accepted by members of that community and that one 'fits in' (Hausmann et al., 2009; Walton & Cohen, 2011). Developing a sense of belonging in HE helps students to achieve and continue in HE

(Hausmann et al., 2009; Meeuwisse et al., 2010), and is regarded a basic human motivation and as such related to general well-being (Maunder, 2018; Walton & Cohen, 2011).

Thirdly, research indicates early academic achievement to be important for a successful transition to HE and in particular highlights the first experiences of assessment as a crucial moment in which students evaluate their own competence as learners and HE student (Coertjens et al., 2017; de Clercq et al., 2022). If this experience is positive, the first moment of assessment helps students to validate their own sense of belonging in HE and academic self-efficacy (Christie et al., 2008).

On-campus social capital

Research and theory posit that social capital plays a critical role in students' ability to navigate the transition to HE, as it relates to students' academic self-efficacy (Bergey et al., 2019; Brouwer et al., 2016), sense of belonging in HE (Brooman & Darwent, 2014; Meeuwisse et al., 2010) and academic achievement (Mishra, 2020; Robbins et al., 2004). Social capital refers to an individual's access to and mobilisation of valuable resources, such as information or support, through connections and networks of relationships (Coleman, 1990; Lin, 1999). In the HE context, on-campus social capital⁴ is particularly valuable. Research in this field highlights both the importance of connections with peers (Neves et al., 2019; Wittner et al., 2020) and with faculty (Brouwer et al., 2016; Schwartz et al., 2018).

For FGHE-students, it may be more challenging to have access to and mobilise the relevant social capital that is necessary to succeed in HE (Álvarez-Rivadulla et al., 2022; Wittner et al., 2020). Research shows that students with higher educated parents may be in advantage in HE, because they can access and mobilise relevant social capital at home, which shows the way to mobilise on-campus social capital which in turn, for instance, helps to provide information regarding study materials, preparing for exams, and support for dealing with academic challenges (Bergey et al., 2019; Mishra, 2020; Spiegler & Bednarek, 2013). Furthermore, students from higher educational backgrounds are more accustomed to the often implicit values, norms, and rules that are valued in the HE environment (Leese, 2010). Although research challenges the assumption that FGHE-students' cannot rely on their families for support (Martin et al., 2020; Rios-Aguilar & Deil-Amen, 2012), these studies also show that on-campus relationships are important for FGHE-students for so-called 'instrumental capital', referring to the resources (e.g., advice, information) that individuals can access through their social networks that help them achieve specific goals (Son & Lin, 2012). Within the current educational environment, FGHE-students may experience more difficulties with building this

4 Throughout this paper, we use the term on-campus social capital to refer to resources that students can access through connections with other actors in the HE environment (e.g., peers, staff). This can be both the physical campus, but also the online campus, which was the most relevant HE environment during the COVID-19 pandemic.

necessary on-campus social capital, as research indicated that these students tend to be less likely to report relationships with peers and faculty (Mishra, 2020; Schwartz et al., 2018).

Strategies for inclusive transition support

To organise inclusive transition support that meets the needs of all students, it is important that interventions address the specific background-related experiences of students (Hausmann et al., 2009). Prior research indicates two related evidence-informed strategies to address challenges that all students may come across in the transition to HE, but that may be particularly relevant for FGHE-students. Firstly, based on research on multicultural education (Denson, 2009; Gurin et al., 2002), the PAP intervention that was examined in the current study was a difference-intervention, implying that it explicitly did not adopt a difference-blind approach, but instead made students aware of ways in which different backgrounds matter for experiences and opportunities in education. Prior research in the US indicates a strong potential of this type of intervention to affect FGHE-students' course grades, showing a strong decrease in an achievement gap between FGHE- and CGHE-students (Stephens et al., 2014; Townsend et al., 2021). This effect was mediated by an increased tendency among FGHE-students to seek support among faculty.

A second strategy adopted by PAP was informed by prior research of interventions based on social capital theory (Coleman, 1990; Lin, 1999). Social capital interventions aim to empower students to build relevant social support networks, by informing students on the role of social capital in advancing goals, helping students to identify current and potential connections, and helping students to build connections (Schwartz et al., 2018). Prior research indicated a potential of these interventions to improve academic outcomes of FGHE-students, however no CGHE-students participated in these studies (Parnes et al., 2020; Schwartz et al., 2018). Similar to the difference-intervention studied by Stephens and colleagues (2014), the effects of the social capital intervention were mediated by an increased likelihood to seek support with instructors (Schwartz et al., 2018). These prior studies on social capital interventions did not examine the potential of these interventions to enhance mobilisation of peer capital, however.

Although connections with faculty are important for a successful transition to HE, social capital research specifically points to the importance of on-campus peer social capital in the transition to HE (Brouwer et al., 2016; Mishra, 2020). Positive relationships with peers can make learning environments feel more academically and socially supportive, thereby positively influencing students' sense of belonging in HE (Meeuwisse et al., 2010; Strayhorn, 2018). Furthermore, discussing study strategies with close peers and watching peers use study strategies can influence academic self-efficacy, as individuals can gain confidence in their own ability to perform certain tasks when observing similar others while performing these tasks (Bandura, 1997; Bergey et al., 2019). PAP therefore included activities that were aimed at both enhancing the mobilisation of faculty and peer social capital in the HE environment.

The current study

The intervention that was examined in the current study, the Pre-Academic Programme (PAP), employs both strategies of difference-intervention (Stephens et al., 2014) and social capital interventions (Parnes et al., 2020; Schwartz et al., 2018) aimed to support FGHE-students in the encounter phase of the transition to HE. A prior study of van Herpen and colleagues (2020) showed that this type of intervention can be beneficial to support students during the transition to HE by impacting students' academic achievement and mobilisation of on-campus social capital. The current study extends on this research by examining heterogeneous effects of programme participation by social background and by examining programme effects on various indicators of transition success, including self-efficacy, sense of belonging, and academic achievement. We hypothesised that participation in this programme has a positive effect on three outcomes that are indicative of a successful transition to HE: early academic achievement (H1), sense of belonging in HE (H2), and academic self-efficacy (H3), and that this positive effect is present both for FGHE- and CGHE-students. Furthermore, we hypothesise that PAP impacted these three outcomes by enhancing students' mobilisation of on-campus faculty social capital (H4) and peer social capital (H5).

Method

Participants and procedure

The data of this study were collected among first-year students of a large state-funded research university located in an urban area of the Netherlands with a yearly enrolment of approximately 6,500 new Bachelor students. Data were collected during the academic year 2020-2021. In total, 580 domestic (i.e., Dutch) and 493 international students completed the 2020-version of PAP, which was organised online due to COVID-19 regulations. To examine the effects of PAP, domestic students who successfully participated in the programme and received a certificate for complete participation (i.e., the participant group) were compared to non-participating domestic students (i.e., the control group). International students and 27 domestic PAP participants who did not receive a certificate due to insufficient attendance were excluded from the sample.

Prospective first-year students filled in a voluntary pre-enrolment questionnaire while applying for the course programme, at latest five weeks before the start of PAP. This questionnaire included an academic self-efficacy scale that was used as pre-test (T0) measure in the current study and included questions on students' expectations of mobilisation of on-campus social capital. Directly after PAP, one week before the start of the academic year, students from the participant and control group were invited by email to complete a post-test questionnaire (T1). The second post-test questionnaire (T2) was conducted in the fourth and fifth week of

the academic year, before the moment of first assessment for all students. Through student identification numbers, the questionnaire data were linked to the university's education research database including data on students' demographics (e.g., generation-status in HE, gender), pre-university academic achievement, and course grades. Ethical approval was granted by the university's ethical committee for this procedure (reference number: 21-083).

Due to the use of these several sources of data and moments of data collection, there are fluctuations in sample size and characteristics between the various analyses that were used to test the hypotheses. Characteristics of the various samples are presented in Table 1. For the analyses on PAP's effect on academic achievement (H1), the Achievement Sample was used, consisting of PAP participants ($n = 463$) and respondents in the control group ($n = 948$) who either filled out the T1 or T2 questionnaire and provided explicit consent. For the analyses of H2 and H3 (i.e., PAP's effect on academic self-efficacy and sense of belonging) and H4 (i.e., mediation via social capital) the Psychosocial Sample was used, consisting of T2 respondents ($n_{\text{pap}} = 115$; $n_{\text{control}} = 544$). PAP's effect on academic self-efficacy was further examined by using the Repeated Measures Sample, including participants with self-efficacy scores on T0, T1, and T2 ($n_{\text{pap}} = 543$; $n_{\text{control}} = 166$).

Table 1. Background information of respondents in the PAP and control group

	Achievement Sample				Psychosocial Sample				Repeated Measures Sample			
	PAP ($n = 463$)		Control ($n = 948$)		PAP ($n = 115$)		Control ($n = 544$)		PAP ($n = 43$)		Control ($n = 166$)	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Generation-status												
Cont.-generation	336	72.5	678	71.5	90	78.3	390	71.7	33	76.7	122	67.5
First-generation	127	27.5	270	28.5	25	21.7	154	28.3	10	23.3	33	32.5
Gender												
Female	328	70.8	614	64.8	89	77.4	383	70.4	34	79.1	121	72.9
Male	135	29.2	334	35.2	26	22.6	161	29.9	9	20.9	45	27.1
pu-GPA^a												
Low	76	16.4	208	21.9	12	10.4	104	19.1	3	7.0	27	16.3
Moderate	262	56.6	598	63.1	72	62.6	362	66.5	29	67.4	110	66.3
High	125	27.0	142	15.0	31	27.0	78	14.3	11	25.6	29	17.5
Faculty												
Medical studies	122	26.3	93	9.8	19	16.5	30	5.5	9	20.9	12	7.2
Economics	33	7.1	66	7.0	5	4.3	49	9.0	-	-	-	-
Humanities	30	6.5	65	6.9	6	5.2	9	1.7	4	9.3	3	1.8
Law	86	18.6	117	12.3	14	12.2	25	4.6	5	11.6	12	7.2

Table 1. Background information of respondents in the PAP and control group (continued)

	Achievement Sample				Psychosocial Sample				Repeated Measures Sample			
	PAP (<i>n</i> = 463)		Control (<i>n</i> = 948)		PAP (<i>n</i> = 115)		Control (<i>n</i> = 544)		PAP (<i>n</i> = 43)		Control (<i>n</i> = 166)	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Social Sciences	71	15.3	318	33.5	42	36.5	269	49.4	14	32.6	85	51.2
Business	81	17.5	263	27.7	26	22.6	145	26.7	10	23.3	50	30.1
Double degree ^b	40	8.6	26	2.7	3	2.6	16	2.9	1	2.3	4	2.4
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
T0 Expected staff interactions (1-5)	3.72	0.64	3.66	0.66	3.75	0.58	3.64	0.67	3.73	0.48	3.67	0.72
T0 Expected peer interactions (1-5)	4.22	0.56	4.17	0.58	4.23	0.57	4.18	0.58	4.22	0.60	5.15	0.63

^a Students with NA on pu-GPA are excluded from the analyses of early grade performance

^b Double degree students are either Law and Economics students or Law and Business students

The Intervention

Incoming first-year Bachelor students were invited to participate in the pre-academic programme (PAP) that was organised during summer 2020 before students enrolled into the first year. The 5-week online (due to COVID-19) programme was organised by the university's outreach department. Each week, participants spent 4-6 hours on sessions and assignments that had to be done individually (e.g., watching video lectures, reading literature, individual assignments) or with peers (e.g., assignments in pairs, group meetings). The group meetings were moderated by team captains, who were volunteering upper-level students.

Informed by priorly researched difference-interventions based on multicultural education (Denson, 2009; Gurin et al., 2002; Schwartz et al., 2018), PAP aimed to make participants aware that their experiences in HE are coloured by their personal background and personal perceptions and that students consequently experience the transition to HE in diverse ways. To reach this aim, participants' personal backgrounds were connected to theories and literature on social and cultural capital during various sessions. First, participants read texts on visible and invisible aspects of identity, and social and cultural capital to inform them about these

concepts. Then, participants did assignments to reflect on their own identity, by making use of the Johari window (i.e., a method to increase self-awareness and mutual understanding with others) and the ways in which identity influences experiences on campus. These assignments were afterwards discussed in groups to make students not only aware of their own background and how this influences their perceptions on campus, but also of the background of their peers.

Social capital theory (Coleman, 1990; Schwartz et al., 2018) was translated into programmatic activities that emphasised that studying in HE is a social and collaborative process and that quality interactions with both peers and academic staff are important for academic achievement and students' further personal and professional development. Therefore, participants had to work on assignments in pairs or in groups throughout the whole programme and each week ended with a group meeting in which the material of the week was discussed in greater depth under guidance of a team captain. These collaborative sessions allowed participants to better get to know their peers. Furthermore, during the last week participants did an assignment in which they mapped their own social capital and were asked to think about ways in which social networks provide individuals with social capital to reach certain goals. The assignments in which students had to work together with peers or had to think actively about the worth of their own social network were primarily aimed to affect the extent to which students interact with peers and faculty on campus.

Measures

Academic self-efficacy was measured with an 8-item scale before (T0) and after (T1, T2) PAP. The scale was developed by Pintrich et al. (1993) and adapted to measure students' beliefs about their capacity to achieve in HE. An example item was: 'I am confident I can understand the basic concepts taught in the course programme'. Response categories ranged from 1 (*not true at all*) to 5 (*completely true*). Cronbach's α 's ranged between .86 and .89 across time-points.

Sense of belonging was measured with a 5-item scale ($\alpha = .78$) in the T2 questionnaire. The scale was derived from Meeuwisse et al. (2010) and adapted to better fit the COVID-19 online-education context by removing an item from the final scale that asked whether students enjoyed coming to campus. An example item of the scale was: 'I feel at home at university'. Response categories ranged from 1 (*not true at all*) to 5 (*completely true*).

Early grade performance was used as an indicator of academic achievement and was measured by early semester grade point average (EGPA), obtained from the university's educational research database. EGPA was measured as the average of students' grades of the first courses, running during the first two months with exams in the beginning of November at the latest, weighted by course credits (EC). Within course programmes, students followed the same courses, which were mostly introductory courses or basic academic skills courses.

The total number of EC that students attained during the first two months varied between course programmes with a minimum of 12 EC and a maximum of 15 EC.

Generation-status in HE was measured via the educational background of students' parents, derived from the university's educational research database. Students whose both parents did not study in HE (ISCED 2011-level 6 or lower) were defined as FGHE-students (Spiegler & Bednarek, 2013). Generation-status in HE was a dichotomous variable with value 0 for CGHE-students and value 1 for FGHE-students.

Mobilisation of faculty capital was measured by two scales, which distinguish between formal (i.e., study-related) and informal interactions with faculty (Meeuwisse et al., 2010). An example item of the *formal faculty interactions* scale (6 items; $\alpha = .73$) is 'Teachers approach me to enquire about my study progress'. An example item of the *informal faculty interactions* scale (7 items; $\alpha = .75$) is 'I talk about my personal situation with teachers'.

Mobilisation of peer capital was measured by two scales used by Meeuwisse et al. (2010) as well. An example item of the *formal peer interactions* scale (6 items; $\alpha = .80$) is 'I collaborate well with fellow students.' An example item of the *informal peer interactions* scale (5 items; $\alpha = .81$) is 'I have close interpersonal relationships with fellow students.' Item response options of the faculty and peer social capital scales ranged from 1 (*not true at all*) to 5 (*completely true*).

The items used to measure the core variables are presented in Appendix A.

Analysis

To examine PAP's effect on the three transition outcomes early grade performance (H1), sense of belonging (H2), and academic self-efficacy (H3), multilevel regression analysis was used, because students (level 1) were nested within faculties (level 2), which would be a violation of the independence assumption (Hox, 2002). Pre-university achievement and gender were firstly included in each of the three multilevel regression models, together with generation in HE. In step 2, PAP participation was included to examine the programme's effect on the outcome variables, while controlling for pre-university achievement and gender. Subsequently, an interaction term of PAP*FGHE-status was included to examine whether associations between PAP and the three outcome variables varied across generation in HE. Because of the low number of level-2 units (i.e., seven faculties), robustness analyses were performed with ordinary least square (OLS) regression models with the various faculties included as dummy variables (see Table 4).

Besides using multilevel regression analyses, the effect of PAP on academic self-efficacy (H3) was further examined by an analysis of the pre-test (T0) post-tests (T1, T2) data using mixed analysis of variance including PAP participation as between-subject factor and time as within-

subject factor. This analysis allowed to test for the intermediate effect of PAP on self-efficacy (T1) as well as its' lasting effect over a few weeks (T2).

To address H4 on the mediation effect of PAP on the three transition outcomes via mobilisation of social capital, we applied path analysis in R using the package *Lavaan* (Rosseel, 2012). The overall goodness of fit of the model was tested with various indices (Kline, 2011). Indications of a good-of-fit model are a non-significant chi-square test, CFI and TLI > 0.95, and RMSEA < 0.06. For indirect effects of PAP via social capital mobilisation, bias-corrected bootstrapped 95% confidence intervals are reported.

Results

Preliminary Analyses

Preliminary analyses of the background characteristics of the PAP group and control group (see Table 1) were conducted to assess whether selection effects occurred. Chi-squared tests indicated that the two groups differed significantly from each other, in the sense that women, $X^2(1)=4.91, p=.03$, and students with higher prior educational achievement, $X^2(2)=30.6, p<.001$, were overrepresented in the PAP-group. To partly adjust for this imbalance, gender and prior educational achievement were included as covariates in the multilevel models. The groups did not differ from each other in terms of generation in HE. Furthermore, *t*-tests indicated no significant differences between the PAP and control group on pre-enrolment expectations of interactions with peers, $t(909.83)=-1.64, p=.10$, and interactions with staff, $t(921.33)=-1.51, p=.13$.

Mean scores, standard deviations, and Spearman correlations of the study's core variables are presented in Table 2. The PAP group and control group have similar means on the transition outcomes EGPA ($M_{\text{PAP}} = 7.00; M_{\text{control}} = 6.96$) and self-efficacy on T2 ($M_{\text{PAP}} = 3.61; M_{\text{control}} = 3.59$), with low corresponding effect sizes of $d = .04$ for EGPA and $d = .03$ for self-efficacy. On the third transition outcome, sense of belonging, the PAP group ($M = 3.95$) scored higher than the control group ($M = 3.67$), with a medium effect size of $d = .39$. Lastly, turning to the social capital variables, Table 2 shows that the PAP group scores higher on formal peer interaction ($M_{\text{PAP}} = 3.81; M_{\text{control}} = 3.62$) and informal peer interaction ($M_{\text{PAP}} = 3.34; M_{\text{control}} = 3.08$) with corresponding medium effect sizes of respectively $d = .27$ and $d = .28$. No score difference have been observed between the PAP group and control group on the variables indicating mobilisation of faculty social capital (i.e., formal faculty interactions and informal faculty interactions).

Table 2. Mean scores, standard deviations, and Spearman correlations of variables.

Variables	M (SD)	PAP	M (SD)	Control	d-value	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	
Achievement Sample																			
1. PAP ^a			(-)																
2. FGHE-student ^a			-0.01	(-)															
3. First term GPA ^b	7.00 (0.97)		0.02	-0.07*	(-)														
4. Self-efficacy(T0) ^c	4.13 (0.51)		0.07*	-0.07*	(-)														
5. Male ^a			-0.06*	-0.01	-0.05*	(-)													
6. Moderate pu-GPA ^a			-0.06*	-0.01	-0.02	0.05	-0.05	(-)											
7. High pu-GPA ^a			.14*	-0.05*	.28***	-0.01	-0.05	-0.60***	(-)										
Psychosocial Sample																			
8. Self-efficacy(T2) ^c	3.61 (0.65)		0.03																
9. Sense of belonging ^c	3.95 (0.73)		0.39																
10. For. peer int. ^c	3.81 (0.75)		0.27																
11. Inf. peer int. ^c	3.34 (0.97)		0.28																
12. For. staff int. ^c	3.38 (0.66)		0.08																
13. Inf. staff int. ^c	2.53 (0.76)		0.06																

Note: Spearman Correlations for Psychosocial Sample variables are presented above the diagonal, correlations for Achievement Sample variables below the diagonal.

^a Dummy variables (0 = no, 1 = yes); reference category of moderate and high pu-GPA is low pu-GPA.

^b Variable with 1-10 scale.

^c Variables with 1-5 scale.

* $p < .05$; ** $p < .01$; *** $p < .001$

Transition outcomes

Table 3 presents the multilevel regression models of PAP's effect on EGPA (achievement sample), and sense of belonging and academic self-efficacy (psychosocial sample). Models 0 in Table 3 firstly allowed to assess the variance of the outcome variables that can be explained at faculty level by calculating intra class correlations (ICCs). For EGPA the ICC was .187, implying that approximately 18.7% of its' variance can be explained on faculty level. For academic self-efficacy the ICC was .090 and for sense of belonging .041. If anything, these results indicated that there are important aspects on faculty level that particularly influence EGPA and to a lesser extent academic self-efficacy and sense of belonging. These results support our choice for multilevel models to avoid Type-I errors (Musca et al., 2011).

Model 1 of EGPA indicated no association with FGHE-status ($b=-.03$ $p=.604$): grades obtained by FGHE-students did not differ significantly from grades obtained by CGHE-students when controlling for gender, prior academic performance, and academic self-efficacy (T0). In Model 2, PAP participation was included. This model showed that, after adjusting for prior academic performance, gender, and T0 self-efficacy, students in the PAP-group received higher grades during the first few weeks in HE than students in the control group ($b=.11$; $p=.025$), which supports H1 expecting a positive effect of PAP participation on academic achievement. The small and non-significant interaction term of PAP participation and FGHE-status ($b=-.02$; $p=.849$) included in Model 3 further suggested that the programme's effect on EGPA did not differ depending on generation in HE: FGHE-students did thus not benefit more or less from PAP participation regarding their grade performance as compared to CGHE-students.

Model 1 of sense of belonging did not indicate a significant main effect of FGHE-status either ($b=.01$; $p=.931$), implying that FGHE-students' sense of belonging in HE did not differ from their CGHE-peers. A positive and significant effect of PAP participation on sense of belonging HE was shown in Model 2 ($b=.22$; $p=.002$), indicating that students who participated in the programme felt a stronger connection with the campus community after one month in HE than non-participants, supporting our expectations as formulated in H2. In Model 3, the interaction term of PAP participation and FGHE-status is small and non-significant ($b=.07$; $p=.705$), suggesting that PAP's effect on sense of belonging was similar for FGHE-students and CGHE-students.

Table 3. Multilevel regression models of transition outcomes

	Achievement sample	Psychosocial sample	
	Early grade performance	Sense of belonging	Academic self-efficacy
Model 0			
Intercept	6.892 (.157)***	3.79 (.068)***	3.528 (.080)***
Individual level var.	.727 (.853)	.49 (.698)	.364 (.603)
Faculty level var.	.167 (.408)	.02 (.146)	.036 (.189)
AIC	3587.410	1412.282	1224.224
BIC	3603.166	1425.749	1237.692
Model 1			
Intercept	6.370 (.250)***	2.798 (.234)***	1.807 (.194)***
First gen. status	-.025 (.048)	.005 (.063)	.028 (.051)
Self-efficacy (T0)	.003 (.042)	.231 (.051)***	.411 (.042)***
Male	-.112 (.048)*	-.046 (.066)	.201 (.054)***
Achievement			
<i>Low</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>
<i>Moderate</i>	.491 (.055)***	.092 (.074)	-.036 (.060)
<i>High</i>	1.108 (.072)***	.017 (.099)	-.031 (.081)
AIC	3268.164	1374.227	1111.733
BIC	3309.979	1409.906	1147.412
Model 2			
Intercept	6.351 (.252)***	2.780 (.222)***	1.805 (.194)***
PAP	.106 (.047)*	.223 (.073)**	.037 (.060)
First gen. status	-.022 (.048)	.011 (.063)	.029 (.051)
Self-efficacy (T0)	-.003 (.042)	.224 (.051)***	.409 (.042)***
Male	-.104 (.048)*	-.043 (.065)	.202 (.054)***
Achievement			
<i>Low</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>
<i>Moderate</i>	.492 (.055)***	.083 (.074)	-.083 (.060)
<i>High</i>	1.100 (.072)***	-.009 (.099)	-.036 (.082)
AIC	3269.402	1370.608	1117.150
BIC	3316.444	1410.747	1157.289
Model 3			
Intercept	6.349 (.252)***	2.777 (.222)***	1.802 (.194)***
PAP	.111 (.054)*	.208 (.083)*	.015 (.068)
First gen. status	-.016 (.058)	.001 (.068)	.015 (.055)
Self-efficacy (T0)	-.003 (.042)	.225 (.051)***	.411 (.042)***
Male	-.104 (.048)*	-.043 (.065)	.202 (.054)***
Achievement			
<i>Low</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>
<i>Moderate</i>	.492 (.055)***	.084 (.074)	-.036 (.060)

Table 3. Multilevel regression models of transition outcomes (continued)

	Achievement sample	Psychosocial sample	
	Early grade performance	Sense of belonging	Academic self-efficacy
<i>High</i>	1.100 (.072)***	-.006 (.099)	-.031 (.082)
PAP*First gen.	-.019 (.102)	.065 (.173)	.098 (.141)
AIC	3274.093	1374.139	1120.749
BIC	3326.362	1418.738	1165.348

Note. Standard error is presented between brackets.

* $p < .05$; ** $p < .01$; *** $p < .001$

Model 1 of sense of belonging did not indicate a significant main effect of FGHE-status either ($b = .01$; $p = .931$), implying that FGHE-students' sense of belonging in HE did not differ from their CGHE-peers. A positive and significant effect of PAP participation on sense of belonging HE was shown in Model 2 ($b = .22$; $p = .002$), indicating that students who participated in the programme felt a stronger connection with the campus community after one month in HE than non-participants, supporting our expectations as formulated in H2. In Model 3, the interaction term of PAP participation and FGHE-status is small and non-significant ($b = .07$; $p = .705$), suggesting that PAP's effect on sense of belonging was similar for FGHE-students and CGHE-students.

Lastly, Table 3 presents the multilevel regression models of academic self-efficacy. Similar to the models of EGPA and sense of belonging, these models did not show a significant effect of FGHE-status on self-efficacy ($b = .03$; $p = .581$). The models further indicated that PAP participation did not affect self-efficacy ($b = .04$; $p = .537$). The interaction term of PAP participation and FGHE-status is also non-significant ($b = .10$; $p = .487$).

To further examine PAP's effects on academic self-efficacy (H3), a mixed ANOVA was performed using data from the pre-test post-test repeated measures sample (see Table 1), including PAP participation as between-subject factor and Time as within-subject factor. Mauchly's test indicated that the assumption of sphericity had been violated ($X^2 = .87$, $p < .05$). Therefore, Greenhouse-Geisser epsilon was used to adjust for degrees of freedom for the within-subject factor ($\epsilon = .887$). The results showed no significant effect of PAP participation ($F(1, 207) = .08$, $p = .930$, $\eta^2 < .001$) or the interaction of PAP and time ($F(2, 414) = .69$, $p = .503$, $\eta^2 = .001$). In line with the multilevel regression analysis of self-efficacy, the mixed ANOVA thus indicated that students in the PAP group and the control group did not vary from each other in terms of academic self-efficacy. Contrary to our expectations (H3), we thus need to conclude that an effect of PAP on academic self-efficacy is absent.

Table 4. OLS-regression models of transition outcomes for robustness checks

	Achievement sample	Psychosocial sample	
	Early grade performance	Sense of belonging	Academic self-efficacy
Intercept	6.209 (.190)***	2.967 (.246)***	1.591 (.120)***
PAP	.113 (.054)*	.182 (.084)*	.001 (.068)
First gen. status	-.016 (.058)	.001 (.068)	.014 (.056)
Self-efficacy (T0)	-.004 (.042)	.223 (.051)***	.410 (.042)***
Male	-.103 (.048)*	-.022 (.066)	.209 (.054)***
Achievement			
<i>Low</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>
<i>Moderate</i>	.494 (.055)***	.083 (.074)	-.030 (.060)
<i>High</i>	1.103 (.072)***	-.010 (.102)	-.007 (.083)
PAP*First gen.	-.019 (.102)	.066 (.173)	.102 (.141)
Faculty			
<i>Medical studies</i>	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>
<i>Economics</i>	-.406 (.101)***	-.315 (.143)*	-.108 (.117)
<i>Humanities</i>	.589 (.098)***	.112 (.207)	.450 (.169)**
<i>Law</i>	-.362 (.080)***	-.028 (.158)	.193 (.129)
<i>Social Sciences</i>	.435 (.071)***	-.271 (.113)*	.347 (.092)***
<i>Business</i>	.812 (.073)***	-.306 (.120)*	.374 (.098)***
<i>Double degree</i> ^a	-.097 (.111)	.066 (.173)	.085 (.152)

Note. Standard error is presented between brackets.

^a Double degree students are either Law and Economics students or Law and Business students.

* $p < .05$; ** $p < .01$; *** $p < .001$ OLS-regression analyses of PAP's effect on the three transition outcomes including six faculty dummy variables were performed as robustness analyses. Similar to the multilevel regression models, these models indicated positive and significant effects of PAP on EGPA and sense of belonging, but not on academic self-efficacy, and no significant effects of FGHE-status or the interaction term FGHE-status*PAP.

Path analysis of mediation via on-campus social capital

To examine whether the positive effects of PAP on EGPA and sense of belonging were mediated by a positive effect of PAP on mobilisation of peer social capital (i.e., formal and informal peer interactions) and faculty social capital (i.e., formal and informal faculty interactions), we performed a path analysis, using a stepwise procedure. The baseline model included all effects of PAP on the two outcome variables EGPA and sense of belonging, the effects of the four peer and faculty variables on these two outcome variables, and the effects of PAP on the peer and faculty interaction variables. This model achieved the following fit indices: $\chi^2(6) = 831.712$; $p < .001$ CFI = .204, TLI = -1.788, RMSEA = .462; 90% CI [.435; .488], implying poor model fit.

Table 5. Summary of unstandardised coefficients for the final path model (Fig. 1)

	Unstandardised coefficients	Standard error	95% confidence interval	
			Lower bound	Upper bound
Early grade performance ^a				
PAP	0.248**	0.091	0.069	0.428
FPI	0.089	0.052	-0.013	0.191
FSI	-0.101	0.053	-0.213	0.007
Sense of belonging ^a				
PAP	0.173**	0.063	0.050	0.296
IPI	0.197***	0.035	0.128	0.266
FPI	0.176***	0.048	0.083	0.269
FSI	0.175***	0.039	0.099	0.251
IPI ^a				
PAP	0.265**	0.096	0.076	0.454
FPI ^a				
PAP	0.202**	0.074	0.057	0.347
ISI ^a				
PAP	0.048	0.079	-0.107	0.203
FSI ^a				
PAP	0.060	0.068	-0.073	0.194

Note. $N=588$

FPI: Formal peer interaction; IPI: Informal peer interaction; FSI: Formal staff interaction; ISI: Informal staff interaction.

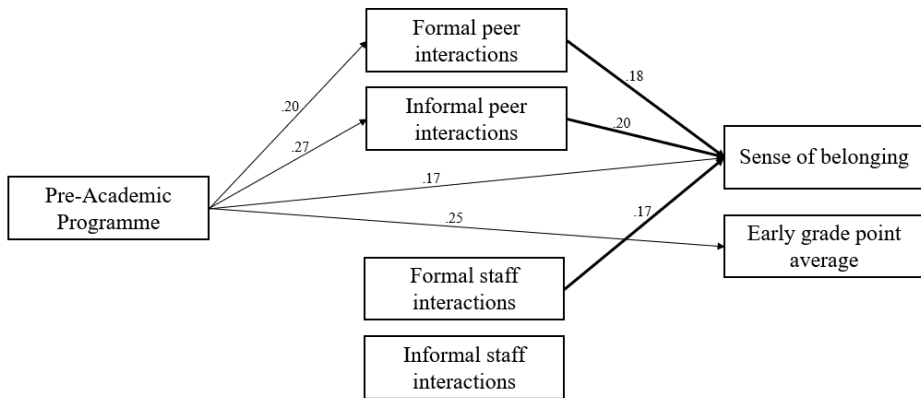
^a Endogenous variables.

* $p < .05$; ** $p < .01$; *** $p < .001$

After including residual correlations between the four interaction variables and excluding non-significant paths between the interaction variables and the two outcome variables, the fit indices indicated good fit of the final model: $\chi^2(1)=0.09$, $p=.764$, CFI=1.00, TLI= 1.02, RMSEA=.00; 90% CI[.00; .07]. This model is depicted in Figure 1. Table 5 shows the standardised estimates for the final model.

The model in Figure 1 indicated a positive and significant relation of PAP with the two variables indicating mobilisation of peer social capital, i.e., formal peer interactions ($b=.202$; $p=.006$) and informal peer interactions ($b=.265$; $p=.006$), but not with faculty interactions. Figure 1 further shows a strong positive relation between (in)formal peer interaction and formal faculty interaction with sense of belonging. EGPA was not significantly related to any of the interaction variables.

Figure 1. Model of the relationships between PAP, peer and faculty interactions, and the transition outcomes



Note. Significant paths (boldfaced $p \leq 0.001$) and standardised coefficients are displayed.

To test H4, we further examined indirect effects of PAP on sense of belonging and EGPA via the (in)formal interaction variables, for which we calculated 95% CI with a bootstrap procedure of 1000 iterations. These calculations indicated indirect significant relationships of PAP with sense of belonging via formal peer interactions ($b^* = 0.036$, [0.007; 0.076], $p = .039$) and informal peer interactions ($b^* = 0.52$, [0.012; 0.098], $p = .018$). Students who participated in PAP thus had more self-reported formal and informal interactions with their peers, which in turn had a positive effect on their sense of belonging in HE. No significant indirect relationship was present between participation in PAP and EGPA, via students' peer interactions ($b^* = 0.02$ [-0.001; 0.047], $p = .140$).

Discussion and conclusion

In the present study, we examined whether PAP, a pre-academic transition programme organised during the encounter stage of the transition to HE (Nicholson, 1990; van Herpen et al., 2020), supported first-year students by impacting three outcomes indicative of a successful transition: early grade performance, sense of belonging and academic self-efficacy. To examine whether the programmes' strategies to organise inclusive support were successful, we further examined whether the programmes' effects differed between FGHE- and CGHE-students. Lastly, we analysed whether positive effects of the programme on the transition outcomes were mediated by an effect on various measures of on-campus social capital (i.e., formal and informal interaction with peers and faculty).

The results indicated that PAP seems to have small but positive impact on students' early academic achievement (H1) and sense of belonging in HE (H2). The analyses of PAP's

outcome on academic self-efficacy (H3) indicated no difference between participants and non-participants. Effects on self-efficacy were absent both directly after PAP and after the first month in HE. Moderation analyses further showed that programme effects did not vary depending on students' generation-status in HE: FGHE- and CGHE-students benefitted from the programme to an equal extent. Path analysis lastly indicated that PAP participants had mobilised more peer social capital (H5), but that an effect on mobilisation of faculty social capital was absent (H4). Mobilisation of peer social capital was in turn positively related to sense of belonging in HE, suggesting that a positive effect of PAP on this outcome could be explained by an improvement of participants' on-campus social capital.

To offer inclusive support, PAP adopted strategies that explicitly address students' diverse experiences during the transition to HE, influenced by students' social background. Firstly, informed by multicultural education (Denson, 2009) and difference-education interventions (Stephens et al., 2014; Townsend et al., 2021), participants reflected on visible and invisible aspects of their identity, the influence thereof on experiences in education, and the possible resources that students could draw from their identities. Secondly, PAP aimed to enhance students' on-campus social capital (Schwartz et al., 2018), informed by research indicating difficulties among FGHE-students to build on-campus connections (Álvarez-Rivadulla et al., 2022; Mishra, 2020). PAP's positive effect on sense of belonging through mobilisation of peer social capital partly offers support for this intended mechanism.

The finding that participation in PAP was unrelated to mobilisation of faculty capital contradicts prior research on social capital transition programmes (Parnes et al., 2020; Schwartz et al., 2018). PAP aimed to impact these connections with faculty by emphasising their importance, by discussing ways to build these connections, and by reducing internal barriers to approach faculty. These modules were, however, more theoretical in nature and therefore not adapted to the online COVID-19 context, which substantially altered student-faculty connections. These theoretical modules were also not turned directly into practice within the online programme environment, as there were only limited possibilities to actually meet faculty during the programme. This is contrary to modules on mobilisation of peer capital, which included many possibilities to practice with connecting and working together with peers in an online environment. The fact that students had limited opportunities to meet faculty during the programme also points to a more general suggestion for programme improvement. In the intervention as studied by Parnes and colleagues (2020), participants engaged in role-playing activities and interviewed individuals with whom participants wanted to connect more (e.g., staff members). These types of practical activities may be essential to provide participants with experiences to enhance orientation towards support seeking from faculty.

A possible explanation for the absence of an effect of PAP on self-efficacy lies in the context-specificity. Self-efficacy is defined as students' confidence to perform well in the specific context of the course programme. Informed by self-efficacy theory (Bandura, 1997) and prior research on peer-led self-efficacy interventions (Bergey et al., 2019), PAP aimed to impact self-

efficacy by activities in which participants discussed study strategies with their peers, based on video lectures watched prior to these discussions. These videos were not specifically tailored towards the specific courses in which participants enrolled after PAP however. These courses differed from each other in terms of content and educational design, ranging from lecture-based education to problem-based learning. Therefore, participants may have experienced doubts while transferring the learned study strategies to the new study context and did not feel more confident about their own ability to succeed academically within their courses. A possible direction for future self-efficacy intervention research might therefore be to examine whether interventions that make strong and explicit connections between the content of the programme and the specific characteristics of course programmes are more effective to influence academic self-efficacy. This connection could for instance be enhanced by organising return sessions, including peer discussions about participants' first experiences with studying at university and applying the study strategies that were addressed in the programme. Besides enhancing students' confidence to successfully study in HE, return sessions may also help students to effectively apply and modify study strategies, which may strengthen the impact of the programme on early grades.

The results of the current study strengthen the evidence of earlier research on the effectiveness of difference-education interventions (Stephens et al., 2014; Townsend et al., 2021) and social capital interventions (Parnes et al., 2020; Schwartz et al., 2018) by showing that these programmes not only have the potential to improve academic achievement, but that these programmes can also affect broader important psychosocial outcomes, such as sense of belonging in HE (Hausmann et al., 2009; Strayhorn, 2018). Furthermore, while previous research often studied programme effects solely among 'target samples' such as FGHE-students (Greer et al., 2023) or showed that programme effects were only present for either underrepresented groups in HE, such as FGHE-students (Townsend et al., 2021) or for majority students (Hausmann et al., 2009), PAP seemed to have facilitated the transition to HE of FGHE- and CGHE-students to an equal extent.

A limitation of the current study are selection effects that might have occurred. Analyses of the participants showed for instance an overrepresentation of students who achieved highly in pre-university education and of women. In our multilevel regression analyses, we partly adjusted for this imbalance by adding covariates in our models to control for gender and pre-university achievement. To estimate causal effects of programme participation, randomisation of participant and control group is to be preferred, however. Furthermore, to offer inclusive support to first-year students, it is important that transition programmes actively aim to reach a group of participants that is more representative of the general student population.

A further important note regarding selection effects is that this is not only a limitation in the analysis of PAP's effectiveness, but also has possibly influenced our results regarding the influence of generation-status in HE on the various transition outcomes. Although our analyses do not show a negative main effect of FGHE-status on the transition outcomes, as one might

expect from previous research (Spiegler & Bednarek, 2013; Wittner et al., 2020), it is beyond the scope of our study to draw conclusions about the influence of FGHE-status on the transition to HE: for instance, FGHE-students who experience a lower sense of belonging in HE (Strayhorn, 2018), may be underrepresented in PAP, and may also be underrepresented in our sample of students for the control group. At the same time, however, our results indicating an absent negative effect of FGHE-status on various outcomes resonate with earlier research done in the Dutch HE context (Brouwer et al., 2016; van Rooij et al., 2018) which shows a different pattern compared to much of the current research that has been done on FGHE-students, mostly in the US. These previous results and our current results indicate a need to further examine the specific challenges of FGHE-students in non-US contexts, by adopting sensitive sampling strategies.

In summary, our study showed that an online intervention organised during the encounter stage of the transition to HE supports students by positively impacting early grade performance and sense of belonging in HE, both among FGHE- and CGHE-students. These findings are relevant for developing effective transition programmes and for adopting effective strategies within the daily educational environment to improve students' success during the transition to HE.



Chapter 4

The role of student background characteristics and sense of belonging in the development of peer networks at the transition to higher education⁵

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Abstract

At the transition to higher education, students from diverse backgrounds develop peer networks that support learning in higher education. However, few studies have investigated how students' background characteristics play a role in social selection mechanisms such as friendship and help-seeking and what drives the formation of diverse peer networks, including the role of students' sense of belonging in higher education. We studied how students' migration background and generation in higher education-status affect peer network development at the transition to higher education and how sense of belonging plays a role in the development of diverse peer networks. In total, 247 first-year higher education students filled out surveys at three times during the first semester at the transition to higher education. Longitudinal complete social network data on students' friendship and help-seeking relationships in the course programme were analysed using stochastic actor-oriented modelling. At the start of the academic year, continuing-generation in higher education students and students with a strong sense of belonging were more active with building relationships. Students were more likely to connect to others with a similar migration background. At later stages of the transition to HE, students who scored high on sense of belonging were more likely to seek help from each other. Our findings underscore the importance of students' background characteristics in the development of friendship and help-seeking networks. Furthermore, we provide first evidence that sense of belonging plays an important role in the formation of peer networks.

Introduction

The transition to higher education (HE) is a challenging and influential stage in students' educational pathways (Coertjens et al., 2017). A central aspect of this transition is that new networks of peer relationships emerge within first-year student populations. Across countries, student populations where these networks emerge are increasingly characterised by diversity in terms of first-generation in HE (FGHE) status and migration background (OECD, 2024). This is also observed in the Netherlands, where the current study is conducted (Statistics Netherlands, 2024a). With FGHE students, we refer to students whose parents did not study in HE (Spiegler & Bednarek, 2013). In the Dutch context, students with a migration background are students with at least one of their parents born outside of the Netherlands (Statistics Netherlands, 2022). Both groups are historically underrepresented in HE and face substantial barriers for student success in education, which is for instance reflected in lower achievement and retention rates (OECD, 2024).

Diversity within student populations plays an important role in emerging peer networks at the transition to HE. Firstly, to enhance equal opportunities for success, HE institutions should provide diverse students with opportunities to build relationships and to become embedded in peer networks in the learning environment. Consistently, studies have shown that both non-academic (e.g., friendships) and academic (e.g., help-seeking) relationships are positive predictors of achievement and retention in HE (Brouwer et al., 2022; Stadtfeld et al., 2019). Friendships with peers provide emotional support and social comfort in the learning environment and peers one could approach for academic help are a major source of advice and information (Buote et al., 2007; Mishra, 2020). These insights on the importance of peer relationships for student success highlight that examining how student background characteristics affect embeddedness in peer networks is vital for understanding the success of diverse students in HE.

Secondly, diversity plays a role in peer networks because diverse student populations provide opportunities for students to connect with dissimilar others, for instance in terms of generation in HE-status (hereafter generation-status) or migration background. A significant body of research has demonstrated positive effects of student population diversity on various outcomes, including critical thinking, perspective taking, and cultural competences (Bowman, 2012; de Hei et al., 2020; Mayhew et al., 2016). Learning opportunities from diversity in student populations do however only come about when cross-group relationships are formed (Gurin et al., 2002; Thijs & Verkuyten, 2014), for example between students with and without a migration background. These relationships hold the potential to challenge previously held beliefs and positively contribute to cognitive growth and attitudinal change, particularly at the developmental stage of transition (Bowman & Brandenberger, 2012; Gurin et al., 2002). Therefore, it is not only important that diverse groups of students become embedded in peer networks, but also that networks do not segregate based on background characteristics.

Previous work on peer relationships in HE shows that students from underrepresented backgrounds tend to face difficulties with becoming embedded into peer networks (Ostrove & Long, 2007; Özbağcı et al., 2023) and that, regardless of their background, students generally tend to build relationships with similar others, leading to network segregation (Colak et al., 2019; Weber et al., 2020). Provided that these network processes hamper student success and learning from diversity, it is vital to uncover elements that contribute to the development of diverse student networks in HE. In this regard, scholars have pointed to the importance of inclusive learning environments where students experience a sense of belonging (Bowman et al., 2019; Wilson et al., 2015). Being a major driver of individual behaviour in social contexts (Strayhorn, 2018), sense of belonging likely plays a role in students' relationship formation and in the stimulation of positive relationships between students from different backgrounds (Bowman et al., 2019; Thijs & Verkuyten, 2014). Fostering a sense of belonging among students may be key to enhancing diverse peer relationships and promoting inclusivity in HE. Existing research is however inconclusive about the role of sense of belonging in diverse peer networks. The current study aims to fill this gap by investigating how student background characteristics, being migration background and generation-status, affect the development of both friendship and help-seeking networks, and whether sense of belonging plays a role in these diverse peer networks. We do so while adopting a longitudinal social network approach (Wasserman & Faust, 1994).

Literature review

Peer network development at the transition to higher education

The transition to HE is a fundamental stage for the emergence and development of peer networks. Research on transition oftentimes applies Nicholson's (1990) transition cycle (Coertjens et al., 2017; de Clercq et al., 2022; van Lamoen et al., 2024), which captures the longitudinal dimension of transition by distinguishing four subsequent stages. The *preparation* stage occurs before students' entrance in HE and entails becoming ready for change and acquiring helpful expectations, motives, knowledge, and skills. The *encounter stage* captures students' experiences and sensemaking of their first confrontation with the HE learning environment. Then, in the *adjustment* stage, students actively attempt to cope with the demands of the new learning environment and gradually adjust their attitudes and behaviours to succeed, which occurs approximately until the end of students' first year in HE. Lastly, ideally speaking, adaptation occurs during the *stabilisation stage*.

The emergence of student peer networks occurs mostly at the encounter and adjustment stages (Brouwer et al., 2022; Stadtfeld et al., 2019). At the encounter stage, students meet for the first time with peers and build first relationships. The adjustment stage provides opportunities to deepen these relationships (van Duijn et al., 2003; Willems et al. 2022). It

is therefore essential to study the emergence and development of diverse peer networks in HE at the encounter and adjustment stage of the transition to HE. At these stages, various processes play a role in the development of peer networks, including the extent to which diverse students become embedded in friendship networks and help-seeking networks, and the extent to which these networks segregate based on student background characteristics.

Embeddedness, referring to the number of ties of a student in the peer network, can result from both students' activity and popularity within the network (Wasserman & Faust, 1994). Activity indicates the extent to which students actively seek out and engage in interactions with their peers. Popularity indicates the degree to which students are sought out by others for friendship and help. Activity and popularity are both individual-level network phenomena. Prior research has shown that students with higher academic achievement are for instance more active with befriending peers and asking for help (Brouwer et al., 2018; Brouwer & Engels, 2022) and that students who are perceived as clever are more popular to ask for advice (Lomi et al., 2011; Stadtfeld et al., 2019).

Segregation refers to a network-level phenomenon whereby relations between similar dyads (e.g., two students with both a non-migration background) are more likely than relations between dissimilar dyads (Wasserman & Faust, 1994). An important driver behind segregation is homophily, which is the tendency of individuals to connect to similar others (McPherson et al., 2001; Tajfel, 1982), such as based on gender (Weber et al., 2020). Individuals have the tendency to connect with similar others because, on average, those who are similar understand each other better, communicate with less effort, and find each other more trustworthy and predictable. This, taken together, makes these relationships more comforting, stable, and less prone to conflict (McPherson et al., 2001).

The role of student background characteristics in peer networks

Prior research indicated that individuals' underrepresented backgrounds in specific social contexts play a role in the emergence and development of their social connections (McFarland et al., 2014). In line with this, research and theory suggest that students' generation-status and migration background may affect embeddedness in peer networks and play a role in segregation of these networks (Colak et al., 2022; Rubin, 2012). We specifically focus on generation-status and migration background in this study as prior research has shown that FGHE-students and students with a migration background are less academically successful in terms of grades and retention (OECD, 2024) and because these students tend to face more difficulties at the transition to HE (Coertjens et al., 2017; Mishra, 2020).

Underrepresented students' network embeddedness

Regarding embeddedness, social and cultural capital theory suggest that FGHE-students experience more adjustment difficulties at the transition to HE, due to less familiarity with the middle-class norms and culture on campuses (Ostrove & Long, 2007; Spiegler & Bednarek, 2013). These difficulties include social adjustment in the HE learning environment. In line with this theoretical expectation, Grayson (2011) and Özbağcı et al. (2023) found that FGHE-students reported fewer on-campus friendships than their continuing-generation in HE (CGHE) peers. These results thus indicate lower embeddedness among FGHE-students due to lowered activity in the friendship networks. Other studies did not find differences between FGHE- and CGHE-students however (Álvarez-Rivadulla et al., 2022; Wittner et al., 2022). These mixed findings align with Rubin's (2012) meta-analysis on FGHE-students' social integration. From this meta-analysis, Rubin (2012) suggested an effect of time, in the sense that generation-status based differences in network embeddedness are most pronounced at the encounter stage of the transition to HE, when students have their first confrontation with the HE norms and culture.

For underrepresented students with a migration background, experiences of exclusion and discrimination in educational contexts may play a negative role in peer network embeddedness (Colak et al., 2022; Mishra, 2020). These experiences lead to less possibilities for and lower orientation to relationship building among the excluded individuals (Reynolds, 2007). Exclusion could also more directly lead to lower embeddedness, if students with migration backgrounds are considered less popular to ask for help due to pervasive stereotypes of these students as less academically capable (Green et al., 2019). This would imply that students with a migration background are less often asked for help compared to their peers without a migration background and thus become less embedded in peer networks.

Segregation based on generation-status and migration background

Homophily based on migration background is well-established in the literature (Colak et al., 2019; Wimmer & Lewis, 2010). In a qualitative study of HE students with a Turkish background in Belgium, Colak et al. (2019) found that these students preferred friends with similar migration backgrounds, due to higher levels of familiarity and a common understanding. This allowed for deeper and more meaningful relationships than with students from Belgian origin. Most social network studies on segregation by migration background in HE have addressed this phenomenon in friendship networks (Wimmer & Lewis, 2010; Zhou et al., 2024). However, Weber et al. (2020) found that HE students tend to prefer not only befriending but also collaborating with peers who share similar migration backgrounds. Help-seeking networks share important characteristics with collaboration networks, in the sense that both relationship types are characterised as study-related, task dependent, and as strongly related to academic success (Brouwer et al., 2018). From this, it may be expected that a tendency for migration-background homophily is also present in help-seeking networks.

The aforementioned study of Weber et al. (2020) showed that, in addition to preferred similarity in migration background, students have a preference to collaborate with peers with similarly educated parents. Other studies found evidence for the tendency of people with similar socioeconomic backgrounds to connect, albeit with small magnitude (Chabot, 2024; McFarland et al., 2014). One main reason for this smaller homophily effect, is that one's socioeconomic status is often less visible than migration background, as individuals with migration backgrounds often also belong to ethnic minority groups. Homophily effects are known to be stronger on visible dimensions (McPherson et al., 2001).

The role of sense of belonging in peer networks

To facilitate the emergence and development of diverse peer networks in HE and overcome the tendency of students to connect to similar others, it is important to create inclusive learning environments where all students experience a sense of belonging (Bowman et al., 2019; Thijs & Verkuyten, 2014). Sense of belonging refers to a feeling of connectedness with the HE community, that one is accepted by members of that community, and that one fits in (Dias-Broens et al., 2024; Hurtado & Carter, 1997; Walton et al., 2012). Belonging can be conceived of as a cognitive evaluation of one's place in a social environment that leads to attitudinal and behavioural responses (Strayhorn, 2018). This may include the initiation of relationships with peers (Walton et al., 2012; Wilson et al., 2015). Students who enter the new learning environment with a higher sense of belonging might be more active with forming friendships and asking for help and they may have an easier time with building peer relationships. In a study among college students, Won et al. (2021) for instance found that students with a higher sense of belonging reported more use of adaptive help-seeking strategies. From this, it can be expected that students with more sense of belonging are more active with befriending peers and asking for help and thus become more embedded in both types of networks.

Besides enhancing students' general network embeddedness, sense of belonging might be particularly important to enhance underrepresented students' embeddedness in peer networks and to facilitate the development of diverse networks. Traditionally, sense of belonging has mainly been studied in an effort to deepen our understanding of underrepresented students' experiences in HE (Hurtado & Carter, 1997; Strayhorn, 2018). This research not only shows that underrepresented students tend to have lower mean levels of sense of belonging (Spiegler & Bednarek, 2013), but also that these students experience stronger positive effects of sense of belonging in HE on academic achievement and engagement (Gillen-O'Neel, 2021; Pitman & Richmond, 2007). Similarly, negative effects of students' generation-status or migration background on network embeddedness may be dampened when these students experience a sense of belonging in the learning environment. Moreover, sense of belonging might enhance diverse networks and prevent segregation, as a strong sense of belonging enhances the extent to which students feel related to their peers who are present in the classroom, possibly with dissimilar backgrounds, and may enhance students' inclinations to relate with these students

(Bowman et al., 2019; Thijs & Verkuyten, 2014). In other words, background-related homophily effects in the friendship and help-seeking networks may be less strong among students who experience a strong sense of belonging.

Research on the relationship between sense of belonging and peer relationships seldomly adopts a longitudinal social network approach. To investigate the role of belonging in peer networks, it is however necessary to separate students' subjective belonging in the social environment, measured by self-reports, from the objective relationships between individuals, best measured by sociometric instruments (Kreutzmann, 2018; Zander, 2018). Furthermore, a longitudinal social network approach allows to investigate how sense of belonging explains observed network change net of other effects of network processes in the model (Snijders et al., 2010). This is important while studying whether sense of belonging affects peer network development instead of the other way around.

The current study

In sum, the transition to HE is a crucial phase in peer network development in the HE learning environment. Literature highlights a diversity of backgrounds of first-year students and the potential impact of this diversity on peer networks. However, only limited research has addressed how background characteristics influence the unfolding of peer networks over time by using a social network approach (Mayer & Puller, 2008; Weber et al., 2020; Wimmer & Lewis, 2010). As these studies primarily focus on homophily in friendship networks, insights on underrepresented students' embeddedness in networks and development of help-seeking networks is particularly lacking. Moreover, there is a general gap in the literature on investigating sense of belonging from a social network perspective. To further understanding of sense of belonging and its' role in the development of diverse peer networks, it is crucial to utilise sociometric measures of peer connections (Kreutzmann et al., 2018).

A better understanding of the impact of student background characteristics and sense of belonging on network formation is direly needed to enable HE institutions to better facilitate a successful transition into HE for all students and to let students fully benefit from learning and developing in diverse educational classrooms. In our study we therefore address the questions whether generation-status, migration background and sense of belonging affect students' embeddedness in friendship and help-seeking networks over time (RQ1), and whether these peer networks segregate along the lines of students' generation-status, migration background and sense of belonging due to a preference of students to connect with similar others on these dimensions (RQ2).

We studied these questions in the context of the transition to HE and by analysing longitudinal social network data to measure perceptions of the relationships among all first-year students enrolled in a Psychology programme in the Netherlands simultaneously over time. These

network data are analysed with stochastic actor-oriented models (Snijders et al., 2010), which allow to distinguish simultaneous dynamics of network formation and their relationship to student characteristics.

Method

Sample and procedure

Data were collected during the academic year 2022-2023 among first-year students at an undergraduate Psychology programme of a research university in an urban area of the Netherlands. The course programme is offered in a student-centred small group learning environment based on principles of problem-based learning (Wijnia et al., 2011). The academic year is divided into eight periods of each five weeks. Students met twice a week in small tutorial groups together with 12 to 20 students and a tutor who guided the group and facilitated group discussions. In total, 247 first-year students participated across three waves of data collection. The response rate was high (88%; 81%; 88%), with 23 students not responding across the three waves and 7 students dropping out of the programme after the second wave. Background characteristics of participants are presented in Table 1.

Table 1 *Descriptive statistics of the demographic characteristics*

Demographic characteristics	Category	N (%)
Gender	Male	47 (19.0%)
	Female	200 (81.0%)
Generation-status	Continuing-generation in HE student	158 (64.0%)
	First-generation in HE student	89 (36.0%)
Migration background	None	169 (68.4%)
	Western migrant background	20 (8.1%)
	Non-Western migrant background	58 (23.5%)

Note: Total $N = 247$. Students were on average 19.96 years old ($SD = 2.52$).

Individual-level data (i.e., background data and sense of belonging) and relational-level data (i.e., nominations of friendship and help-seeking relations) were collected via surveys. We conducted these surveys across three timepoints: at the start of the academic year (the encounter stage) in September (T1), the early adjustment stage in November (T2), and in the late adjustment stage at the end of the first semester in January (T3). Before students filled out the surveys, we explained the study's aims and procedures (e.g., anonymous data storage, ethical guidelines) and that participation was voluntary. Through student identification numbers, survey data were linked to the university's education research database, including data on demographics (e.g., generation-status, migration background, gender) and course

grades. All participants gave active informed consent for using their data and ethical approval was granted by the university's ethical committee for this procedure (reference number: 2223-0646).

For the two network questions in this study, students could nominate any peer enrolled in the same Psychology cohort. To do so, students firstly entered their student number, after which a complete list of peers enrolled in the same tutorial group was presented. Additionally, students could nominate ten other peers from the Psychology programme. They did so in response to a question asking with whom the students had regular contact (e.g., activities, talking) in the past three weeks, besides students from their tutorial group. Students were supported with this free recall method as names of peers popped up automatically when they typed a part of the name of their peer.

Measures

Friendship and help-seeking networks. In all waves, sociocentric data were collected through nomination questions. For the friendship network, students were asked to nominate peers from their course programme who they consider friends. For the help-seeking network, students were asked to nominate peers they go to for academic related advice and support. Friendship and help-seeking relations were measured as dichotomous variables (0 = “not a friend”; 1 = “friend” and 0 = “no help-seeking relation”; 1 = “help-seeking relation”). Hence, network data with values 0 indicated an absent tie/relationship and values 1 indicated a present tie/relationship. This dichotomous format facilitated longitudinal network analysis with package RSiena (see analytical strategy; Ripley et al., 2024).

Sense of belonging. A six-item scale, derived from Meeuwisse et al. (2010), was used to measure sense of belonging. For our study we adapted items to reflect sense of belonging in the Psychology course programme. Example items are ‘I enjoy the atmosphere at this course programme’ and ‘I am different in comparison with other students in this course programme’. Cronbach's alpha's indicated sufficient reliability at all waves of data collection ($\alpha_{t1} = .71$; $\alpha_{t2} = .78$; $\alpha_{t3} = .77$).

Generation in HE-status. Survey questions asked students whether their parents studied at a research university or at a university of applied sciences. Students of which neither of the parents studied at these educational levels (i.e., ISCED 2011-level 6 or lower) were defined as FGHE-students (Spiegler & Bednarek, 2013). Generation-status was a dichotomous variable with value 0 for CGHE-students and value 1 for FGHE-students.

Migration background. Students' migration background was retrieved from the university's educational research database, which includes information on students' migration background according to the traditional definition of Statistics Netherlands (2022), which makes a

three-category distinction between “no migration background”, “non-Western migration background”, and “Western migration background”. Students were categorised as having a migration background if they migrated themselves or if at least one of their parents migrated to the Netherlands.

Analytical strategy

To capture the dynamic, longitudinal, and interdependent nature of network development, we used stochastic actor-oriented models (SAOM) with the R-package Siena (Simulation Investigation for Empirical Network Analysis; Ripley et al., 2024; Snijders et al., 2010). SAOMs enable simultaneous analysis of network change and influence of actor attributes, such as generation-status, migration background, and sense of belonging. Conventional statistical models, including linear regression models, are not fitted to analyse social networks, because of their assumption of independent observation, which is per definition violated in analyses of networks. Instead, the relations between actors are precisely of interest while analysing social networks. SAOMs allow to take interdependencies into account. It does so by, for instance, modelling that students are likely to provide help to peers who provided help to them before (i.e., reciprocity). In SAOMs, discrete measurement points are used (in our case T1, T2, T3), but an underlying continuous dynamic process of relational change is assumed, because of network structures, actor effects, and dyadic effects (Snijders et al., 2010). The estimates of parameters in the models are log-odds of particular relationship tendencies. When these estimates are positive, it means that students are likely to pursue a particular network state (e.g., reciprocating a friendship). If the estimates are negative, it means that students tend to avoid these states.

For both friendship and help-seeking networks, two selection models were specified to capture network development at various stages of the transition, from T1 to T2 and from T2 to T3. In each model, we included the rate parameter, which modelled how often students changed one of their relationships. Furthermore, several common structural network effects were included in the models. These include 1) the *outdegree effect*: the basic tendency to form a relationship; 2) *reciprocity*: the extent to which forming a reciprocated tie is more likely than a non-reciprocated tie; 3) *transitivity*: the tendency to prefer relationships with peers who already have a relationship with a current relationships, i.e., to form transitive triplets; 4) *transitive reciprocal triples*: the tendency to reciprocate relationships within transitive triplets; 5) *indegree popularity*: the tendency that students receive more nominations over time if they already received more nominations previously; 6) *outdegree activity*: the tendency to nominate more over time if students already nominated more others previously, and 7) *indegree activity*: the tendency to connect more to others if students have more incoming connections.

Next, to analyse the role of generation-status and migration background, we estimated whether these characteristics influence the likelihood of nominating others (*migration background ego*

and *generation-status ego*), the likelihood of receiving nominations (*migration background alter* and *generation-status alter*), or the likelihood to nominate others with the same background characteristic (*same migration background* or *same generation-status*). To analyse the role of sense of belonging, we included parameters to test whether students with a higher sense of belonging were more likely to nominate peers (*sense of belonging ego*), whether students with a higher sense of belonging tended to receive more nominations (*sense of belonging alter*), and whether students related based on similar levels of sense of belonging (*similar sense of belonging*). Further, we estimated interaction effects between *sense of belonging ego*migration background ego* and *sense of belonging ego*generation-status ego* and *belonging ego*same migration background* and *sense of belonging*generation-status*. The first two interactions test whether sense of belonging moderates effects of the background variables on sent nominations. The last two interaction effects test whether sense of belonging moderates students' tendencies to connect to similar others.

Besides generation-status, migration background, and sense of belonging, we included several control variables which are well-known and important drivers of peer network development (Brouwer et al., 2022; Stadtfeld et al., 2019). These include students' gender (*gender ego*, *gender alter*, *same gender*), grades (*grades ego*, *grades alter*, *similar grades*), and tutorial group (*same group*).

Results

Descriptive analysis

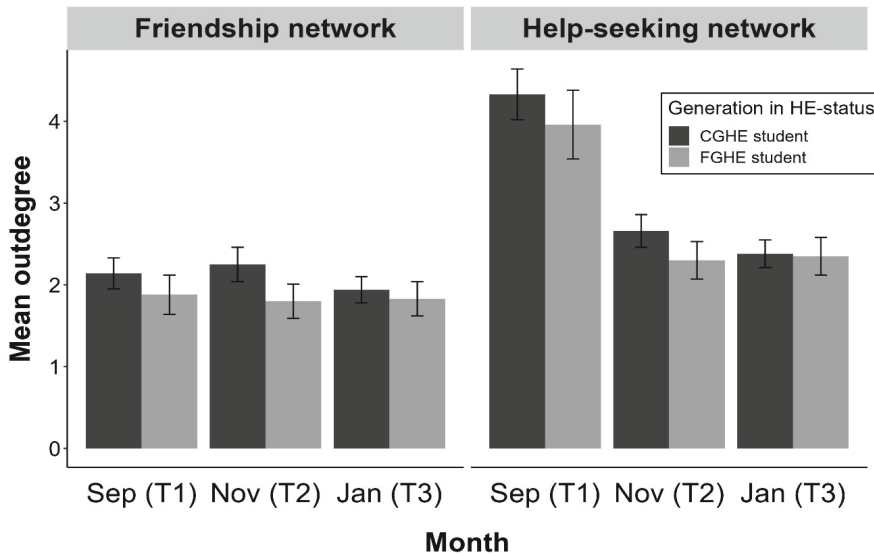
Table 2 provides descriptive statistics for the peer networks at three timepoints. The average degree indicates that students nominated approximately two friends at all three timepoints. The average number of help-seeking nominations was four, which decreased towards the end of the semester (T3) to an average of two. Figures 1 and 2 show average outdegrees (i.e., sent nominations) for FGHE-students compared to CGHE-students and for students from the different migrant background groups. Particularly notable here are the outdegree differences at T2, which show that FGHE-students and students with a non-Western migration background had somewhat less friendship relationships in the course programme at this timepoint in November.

Table 2 Descriptive networks statistics of friendship and help-seeking networks

	Friendship networks			Help-seeking networks		
	T1	T2	T3	T1	T2	T3
Networks statistics						
M degree	1.98	2.01	1.84	4.06	2.45	2.29
SD indegree	1.56	1.81	1.54	2.46	1.95	1.90
SD outdegree	2.32	2.33	1.92	3.82	2.33	2.08
<i>Whole study programme</i>						
Density (%)	0.92	1.00	1.05	1.89	1.00	0.84
Reciprocity (%)	43.41	47.78	52.90	43.64	45.10	49.00
<i>Within tutorial groups</i>						
Density (%)	9.83	8.26	7.86	30.84	13.16	11.07
Reciprocity (%)	51.95	47.55	55.55	48.85	49.97	60.83
Segregation (NACs)						
Generation-status	0.07	0.06	0.08	0.10	0.08	0.13
Migration background	0.06	0.11	0.13	0.04	0.12	0.10
Sense of belonging	0.02	0.09	0.06	0.06	0.08	0.15
Change in relationships						
Jaccard index (stability)	.381	.461		.294	.441	
No. of ties dissolved		216	197		637	246
No. of ties emerged		225	154		239	208
No. of ties maintained		272	300		365	358

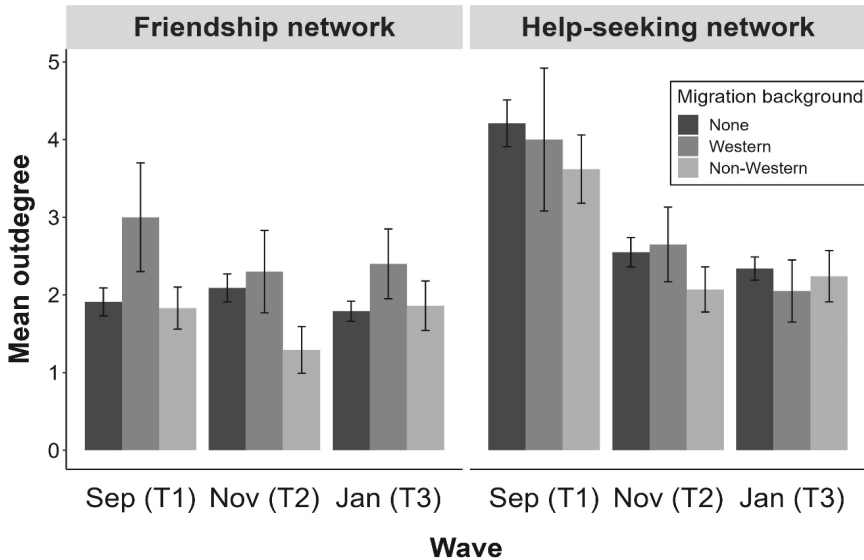
Note. NACs range 0 (no segregation) to 1 (complete segregation).

Density refers to the proportion of possible directed relationships that form actual relationships and was calculated by dividing the number of actual nominations by all possible nominations in the network (Wasserman & Faust, 1994). This was calculated within the first-year complete course programme and in the tutorial groups. Within the complete first-year course programme, only a small percentage of the possible relationships were actual relationships. For friendship, density increased from 0.92% at T1 to 1.05% at T3. For the help-seeking networks, density decreased from 1.89% to 0.84%. Density percentages within tutorial groups were higher, indicating that most relationships were built within tutorial groups. The help-seeking T1 network is particularly notable for its high density of 30.84% within tutorial groups. Between 43.41% and 52.90% of friendship relations and 43.94% and 49.00% of help-seeking relations were reciprocated within the course programme. Reciprocity percentages were similar within tutorial groups. The percentage of reciprocated relationships increased across the first semester in the networks.

Figure 1 Mean outdegrees across waves by generation in HE-status

Note. Mean outdegrees refer to mean number of peer nominations (error bars show standard errors).

Table 2 further presents Newman's Assortativity Coefficients (NACs), which provide information about segregation in the networks based on generation-status, migration background, and sense of belonging (Newman, 2003). NACs have a value 0 when the number of in-group relationships between similar students on the three variables are equal to the number of in-group relationships that would be expected by chance. NACs have a value of 1 when all relationships are formed between similar individuals, meaning complete segregation. The NACs in Table 2 thus indicate some segregation in the peer networks along the lines of generation-status, migration background, and sense of belonging, albeit NACs are generally low. Segregation based on generation-status and sense of belonging was somewhat more attenuated in the help-seeking network and increased over time. Segregation based on migration background was stronger in the friendship network.

Figure 2 Mean outdegree across waves by migration background

Note. Mean outdegrees refer to mean number of peer nominations (error bars show standard errors).

Longitudinal social network analysis

SAOM results are presented in Table 3. First, we will discuss structural effects that represent typically observed social mechanisms, and that should be accounted for in social network analysis. Then, we will address the results relating to our research questions on diverse students' embeddedness in and segregation of peer networks.

Structural network effects

Negative and significant *outdegree* parameters in all models in Table 3 mean that students were selective in their nominations and only tended to nominate others if they perceived attractive properties of relationships. The positive *reciprocity* and *transitive triplets* effects are significant (see Table 3), which means that it is more likely that students reciprocated relationships and tended to cluster in groups. Negative effects of *transitive reciprocated triplets* imply that reciprocation was less likely within groups; an effect that was somewhat more attenuated in the friendship networks (T1-T2: Est.= -1.36, $p < .001$; T2-T3: Est.= -0.96, $p < .01$) than in the help-seeking networks (T1-T2: Est.= -0.57, $p < .05$; T2-T3: Est.= -0.43, $p < .05$).

Table 3 SAOM results on the effects of background characteristics and sense of belonging in friendship and help-seeking networks

	Friendship network				Help-seeking network			
	T1 to T2		T2 to T3		T1 to T2		T2 to T3	
	Est.	(SE)	Est.	(SE)	Est.	(SE)	Est.	(SE)
Rate parameter	4.66	(1.80)***	5.31	(0.57)***	9.23	(0.66)***	4.22	(0.52)***
Outdegree	-4.20	(0.41)***	-5.48	(0.43)***	-3.68	(0.42)***	-3.82	(0.33)***
Reciprocity	4.51	(0.92)***	3.11	(0.51)***	3.56	(0.34)***	3.44	(0.42)***
Transitive triplets	1.74	(0.42)***	1.28	(0.22)***	0.90	(0.14)***	0.75	(0.14)***
Trans. recip. triplets	-1.36	(0.27)***	-0.96	(0.32)**	-0.57	(0.27)*	-0.43	(0.20)*
Indegree popularity	0.02	(0.05)	0.01	(0.06)	0.07	(0.03)*	0.03	(0.04)
Outdegree activity	0.13	(0.07)	0.12	(0.03)***	0.02	(0.02)	0.09	(0.03)**
Indegree activity	-0.73	(0.55)	-0.38	(0.18)*	-0.51	(0.13)***	-0.47	(0.14)***
Help-seeking	1.86	(0.40)***	5.17	(0.44)***				
Friendship					2.82	(0.25)***	1.78	(0.22)***
Gender ego (female)	-0.54	(0.39)	-1.46	(0.36)***	0.72	(0.33)*	0.01	(0.25)
Gender alter (female)	0.09	(0.23)	-0.08	(0.24)	-0.25	(0.27)	-0.15	(0.23)
Same gender	0.33	(0.31)	0.38	(0.21)	0.35	(0.24)	0.04	(0.23)
Grade ego	-0.05	(0.09)	-0.14	(0.14)	-0.00	(0.09)	0.04	(0.09)
Grade alter	0.11	(0.11)	0.10	(0.10)	0.11	(0.06)	0.10	(0.08)
Similar grade	0.22	(0.07)**	0.07	(0.11)	0.12	(0.06)*	0.20	(0.09)*
Same group	-0.20	(0.23)	-0.75	(0.31)*	-0.28	(0.19)	0.94	(0.17)***
Gen-stat. ego (FGHE)	-0.41	(0.18)*	-0.39	(0.26)	-0.30	(0.18)	0.12	(0.16)
Gen-stat. alter (FGHE)	0.14	(0.16)	0.09	(0.21)	0.10	(0.14)	0.12	(0.15)
Same gen-status	-0.02	(0.15)	0.05	(0.17)	0.02	(0.13)	0.21	(0.13)
Mig. backgr. ego (NW)	0.14	(0.19)	0.28	(0.32)	0.01	(0.17)	0.06	(0.20)
Mig. backgr. alter (NW)	0.29	(0.28)	0.33	(0.25)	0.26	(0.15)	-0.04	(0.17)
Mig. backgr. ego (W)	-0.84	(0.63)	-0.99	(0.47)*	0.01	(0.34)	-0.22	(0.34)
Mig. backgr. alter (W)	0.21	(0.33)	0.17	(0.27)	0.54	(0.22)*	0.16	(0.24)
Same mig. backgr.	0.42	(0.20)*	0.19	(0.23)	0.45	(0.14)**	-0.00	(0.18)
Belonging ego	0.49	(0.23)*	0.30	(0.32)	0.45	(0.17)**	0.16	(0.19)
Belonging alter	-0.12	(0.16)	-0.16	(0.22)	-0.12	(0.14)	0.33	(0.16)*
Similar belonging	0.07	(0.29)	0.01	(0.37)	-0.07	(0.25)	0.77	(0.29)**

Notes. Convergence t-ratio's all <0.09; overall maximum convergence ratio all <0.25

*** $p < .001$; ** $p < .01$; * $p < .05$

The models further indicate that students who were popular as helpers at T1 became even more popular in the period T1-T2 (*indegree popularity*, Est.= 0.07, $p < .05$) and that, at T2-T3, students tended to give more nominations over time if they previously nominated others more often in the friendship (*outdegree activity*, Est.= 0.12, $p < .001$) and help-seeking network (Est.= 0.09, $p < .01$). Lastly, the negative effects of *indegree activity* in the T2-T3 friendship

network (Est. = -0.38, $p < .05$) and both help-seeking networks (T1-T2: Est. = -0.51, $p < .001$; T2-T3: Est. = -0.47, $p < .001$) show a tendency among popular students to be less active in approaching others for friendships or help.

Embeddedness in peer networks

We found a significant effect for *generation-status ego* in the T1-T2 model for friendship, indicating that FGHE-students were less likely to establish friendships compared to CGHE-students (Est. = -0.41, $p < .05$). This effect was not indicated by the T2-T3 model (Est. = -0.39, $p = .142$), implying that FGHE-students only showed lowered activity to develop friendships early during transition to HE, although these effects are rather small. No further effects of generation-status on network embeddedness were found.

For migration background, the models only indicated embeddedness-related effects for a Western migration background. We found a significant negative effect of *migration background ego (W)* in the T2-T3 friendship model, implying that students with a Western migration background were less likely to befriend others, compared to no-migration background students (Est. = -0.99, $p < .05$). Conversely, the significant positive *migration background alter (W)* effect in the T1-T2 help-seeking model means that students with a Western migration background were more likely to be approached for help (Est. = 0.55, $p < .05$). The models showed no effects of having a non-Western migration background on the number of friendship or help-seeking nominations sent, *Migration background ego (NW)*, or received, *Migration background alter (NW)*.

The models further revealed that the more students felt a sense of belonging in the course programme at T1, the more likely they were to befriend peers (*belonging ego*, Est. = 0.49, $p < .05$) and ask for help (*belonging ego*, Est. = 0.45, $p < .01$). Interestingly, the significant positive *belonging ego* effects disappeared at T2-T3 in both the friendship (Est. = 0.30, $p = .198$) and help-seeking (Est. = 0.16, $p = .393$) networks: sense of belonging thus only mattered for students' activity in the peer networks at the start of the academic year.

Turning to the cross-network effects and control variables, the results showed that when students asked each other for help, it was more likely that they became friends over time (*help-seeking*, T1-T2: Est. = 1.86, $p < .001$; T2-T3: Est. = 5.17, $p < .001$), and the other way around (*friendship*, T1-T2: Est. = 2.82, $p < .001$; T2-T3: Est. = 1.78, $p < .001$). Female students were less likely to befriend others at T2-T3 (*gender ego*, Est. = -1.46, $p < .001$), but were somewhat more likely to ask others for help at T1-T2 (*gender ego*, Est. = 0.72, $p < .05$).

Segregation of peer networks

We found significant positive effects of *same migration background* in the T1-T2 models for friendship (Est. = 0.42, $p < .05$) and help-seeking (Est. = 0.45, $p < .01$): students had the tendency to befriend or ask help from students with a similar migration background. These effects disappeared in the T2-T3 friendship (Est. = 0.19, $p = .407$) and help-seeking (Est. = -0.001, $p = .998$) models, indicating that migration background similarity only played a role in peer selection at the start of the academic year, and not in the initiation of relationships later at the transition. For sense of belonging, the models indicated that help-seeking relationships between students were more likely when students had similar levels of belongingness (*similar belonging*, Est. = 0.77, $p < .01$). This effect was only present in the T2-T3 model, however, suggesting that homophily preference only appeared in a later stage of the transition. No homophily effects were found for generation-status.

Lastly, our control variables show that students preferred to befriend and ask help to students with a similar academic achievement level (*similar grades*). Further, the effects of *same group* indicate preference based on tutorial group (i.e., proximity): at T2-T3, students were less likely to befriend students within their group (*same group*, Est. = -0.75, $p < .05$), but were more likely to ask help to students within their group (*same group*, Est. = 0.94, $p < .001$).

Sense of belonging moderation effects

Besides the main effects of sense of belonging, we investigated whether sense of belonging moderated the relationship between student-background factors and network formation. Specifically, we examined whether sense of belonging moderated *generation-status ego* and *migration background ego* effects, and *same generation-status* and *same migration background* effects. These effects were neither significant in friendship and help-seeking models, nor for generation-status or migration background. This implies that the negative main effect of FGHE-status on the likelihood to befriend others is not weaker (or stronger) when students feel a strong sense of belonging, and that a strong sense of belonging does not heighten (or weaken) the tendency to build cross-group relationships. As including the interaction terms complicated our models and led to undesirable model fit indices, we reported the models for friendship and help-seeking without interaction effect.

Discussion and conclusion

Discussion

To enhance all students' success at the transition to HE and allow students to learn from diversity within student populations, it is important that diverse students become embedded in emerging peer networks at the transition to HE and that these networks are diverse in terms of student backgrounds. Small-group education and inclusive learning environments, where all students experience a sense of belonging, are proposed as facilitators for the emergence of diverse peer networks in HE (Thijs & Verkuyten, 2014). The present study contributes to our understanding of the role of student background characteristics and sense of belonging in network formation by longitudinally investigating the formation of friendship and help-seeking networks at the transition to HE.

First, regarding students' embeddedness in friendship and help-seeking networks (RQ1), we found that FGHE-students are less active with befriending their peers at the encounter stage of the transition to HE, but not at later timepoints at the transition. Migration background does not affect embeddedness in peer networks. Sense of belonging enhances students' activity with befriending peers and asking for help at the encounter stage, and students with higher sense of belonging are also more often approached for help by their peers. These effects imply greater embeddedness in peer networks for students with a higher sense of belonging. A higher sense of belonging however does not weaken the lesser activity with befriending peers among FGHE-students (i.e., no moderation). Second, regarding network segregation (RQ2), we found a tendency among students to befriend and ask help to peers with a similar migration background. Students with no migration background thus have a heightened tendency to connect to peers who also have no migration background and students with a migration background more often connect to peers who also have a migration background. Again, our results showed no moderation effects: students with a stronger sense of belonging do not have a weaker (or stronger) tendency to connect with similar migration background peers. Sense of belonging does however play a role in the selection of helpers by itself: students tend to ask help of peers with a similar sense of belonging, implying some segregation based on sense of belonging.

The lower tendency among FGHE-students to befriend peers corresponds to social and cultural capital theory and research indicating that FGHE-students report fewer friendships in HE (Grayson, 2011; Özbağcı et al., 2023). This effect only occurred at the encounter stage and was not present at later moments. In line with this, prior studies show that FGHE students particularly experience stress while establishing first contacts when they first enter the HE learning environment. This stress is somewhat reduced after establishing first contacts which support further social adjustment in the HE learning environment (Willems et al., 2022). Following previous work (Milem & Berger, 1997; Rubin, 2012;), this suggests that

FGHE-students become more familiar and comfortable with the norms and culture in HE over time, supported by their initial contacts, which positively affects orientation towards further relationship building.

The homophily tendency among students to connect to peers with a similar migration background is also a relatively common finding in research (Colak et al., 2019; Weber et al., 2020; Wimmer & Lewis, 2010). Our findings add to this research, by showing that students not only prefer to befriend peers with similar migration background but also prefer to ask help to these peers. An important note is however that for both background characteristics generation-status and migration background the effects in the networks are limited. Over time, FGHE-students become equally embedded in peer networks as compared to CGHE-students and the migration background-related homophily effect only leads to limited segregation in the networks.

Research suggests that small-group learning environments contribute to the development of diverse peer networks in HE (Brouwer et al., 2018; Thijs & Verkuyten, 2014). This may also explain the limited background-related effects in our study. The small-group problem-based learning environment where our study was conducted may facilitate diverse peer networks, as these small groups provide a safe environment in which students can easily connect to peers, including peers with dissimilar backgrounds (Brouwer et al., 2022; Wijnia et al., 2011). Yet, our results on belongingness in peer networks show that small group education is not sufficient for all students to become embedded in diverse peer networks. Students with lower sense of belonging seem to have more difficulties with building supportive peer relationships and are less often approached for help. Moreover, students' tendency to ask help from peers with similar sense of belonging points to a role of belongingness in network segregation. These findings correspond to earlier studies conducted in HE learning communities showing that students tend to connect with similarly achieving peers and that higher achieving students become more embedded in peer networks compared to lower achieving students (Brouwer et al., 2018, 2022).

By showing empirical evidence on the role of sense of belonging in the development of peer networks in HE, our study makes a significant theoretical contribution to the literature on belonging in education. The higher activity in peer networks among students with a stronger sense of belonging supports theoretical expectations of belonging as a driver of social behaviour (Strayhorn, 2018; Wilson et al., 2015). Particularly in new social contexts, such as the HE learning environment at the transition to HE, belongingness appears to be relevant for social activity. This resonates with the conception of 'mere belonging' as proposed by Walton et al. (2012). This implies that in new social contexts with unfamiliar others, a mere and early sense of perceived social connectedness to and identification with other individuals could drive behaviours within that context, such as relationship building. Although Walton et al. (2012) mainly emphasised the importance of mere belonging for performance-related tasks,

our study contributes by showing the importance of early sense of belonging in driving peer relationships within educational contexts.

The observation that students with a higher sense of belonging are more frequently asked for help and that students tend to ask help from peers with similar belonging highlights that the effect of belonging in peer networks goes beyond enhancing students' own activity. It also affects whether and by whom students are approached for help by their peers. A possible explanation is a connection between sense of belonging and behavioural engagement in HE. For instance, students with a high sense of belonging tend to be more often present and ask questions in class (Gillen-O'Neel, 2021; Strayhorn, 2018). This behaviour makes these students more knowledgeable about the course programme, which makes them more popular as helpers. Furthermore, this behavioural engagement may be a marker of a certain 'student identity saliency' (Holmes et al., 2019), which drives preferences for help-seeking partners with similar identity. Students who perceive themselves as committed students, who strongly identify as HE student, and feel a strong sense of belonging, may oftentimes find themselves asking for help to others with a similar high belongingness and student identity, because they prefer to do so (i.e., identity-based homophily) or because these students are simply more available as they are more often present in HE classrooms and other educational activities in the HE learning environment (i.e., proximity). Looking into possible explanations for these novel findings on the importance of sense of belonging in peer networks would be an interesting endeavour for future research.

Our findings have important practical implications for HE institutions. Peer relationships are a major source of information and support for students at the transition to HE (Stadtfeld et al., 2019; Willems et al., 2022). Small-group education provides a safe and proximal context that facilitates relationships with diverse peers. However, even within small-group learning environments, relationship development requires active behaviour of students which can be hampered when students do not experience a sense of belonging in the learning environment. Especially if doubts about belonging result in limited access to study-related support, this might significantly hinder students' success in HE (Mishra, 2020). Enhancing students' sense of belonging in HE, for instance by providing belonging-specific interventions early at the transition to HE (van Lamoen et al., 2024; Walton & Cohen, 2011), might for instance be a way in which HE institutions can support students with peer relationship development and, consequently, academic achievement and well-being in HE.

Limitations and future directions

There are some limitations to the present study that should be acknowledged. First, in our measurement of migration background, we were restricted to the use of a three-category variable, distinguishing students without migration background, a Western migration background, and a non-Western migration background. Specific categorisation was not possible, because more specific data were not available in the university's database. This omission may have caused some underestimation of migration background-based homophily because students may be particularly inclined to build relationships with peers with a more specific similar background (e.g., both a Turkish background), as these students do not only share experiences of having a migration history in the Netherlands, but also share language and background culture.

Second, the data of the study were gathered among students in one course programme, limiting generalisability to other educational contexts. Next to the instructional approach, which role we discussed above, another relevant aspect may be the demographic composition of the course programme. The latter may have influenced network development, as the extent to which students are a numerical minority influences relationship formation in educational contexts (Bowman & Park, 2014). By comparing multiple course programmes with varying demographic compositions, future studies could investigate the role of the demographic composition in diverse students' network development.

Another direction for future research might be to further investigate how individual cognitions play a role in network development at the transition to HE. Next to our study showing a role of belonging, and previous research indicating an effect of academic self-efficacy in students' integration in networks (Zander et al., 2018), only limited research has addressed how individual cognitions play a role in network development. Future research could for instance investigate the role of students' professional identity, which may enhance collaboration between students (Jensen & Jetten, 2015), or the role of mattering – a concept that has recently been suggested as an alternative to sense of belonging as it accounts for the importance of personal recognition and attention that students require in the HE learning environment (Cole et al., 2020).

Conclusion

In sum, this study examined the role of student background characteristics and sense of belonging in the selection of friendship and help-seeking relations during the transition to HE. The findings suggest that the background characteristics generation-status and migration background play a role at the start of the academic year, but in different ways. Whereas generation-status only influences the number of nominations in the friendship network, migration background primarily influences with whom students build relationships, both in the friendship and help-seeking networks. The extent to which students experience a

sense of belonging at the start of the academic year further positively influences how active they are with forming friendships and help-seeking relations. At a later stage of the first semester, students tend to ask help to others with a similar level of belongingness to the course programme. Altogether, the results show the relevance of adopting a network approach while studying diverse students' social relations and emphasise the importance of considering the transition to HE as a longitudinal process that occurs in stages. Furthermore, our study underlines the importance of an early sense of belonging for all students' social adjustment in the HE learning environment during the transition to HE.



Chapter 5

Professional identity development and sense of belonging of diverse students at the transition to law school⁶

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Abstract

Besides being a challenging educational transition, the transition to higher education can be conceived of as the start of professional identity development in professional fields, for instance law, engineering, and medicine. Research on the role of professional identity at the transition to higher education is however scarce. Our aim is therefore to study how background characteristics and sense of belonging affect students' professional identity and how professional identity in turn relates to academic achievement and study commitment. Survey and student administration data were collected at two timepoints during the transition to HE among first year students enrolled in law school ($N_{t1} = 198$; $N_{t2} = 124$). Results indicated that a sense of belonging to law school was positively related to students' professional identity. However, no effect of sense of belonging was found on change in professional identity between the two timepoints. Students with a migration background reported a lower level of belongingness at the start of the academic year, but a higher level of professional identity. Analyses showed no relationship between professional identity and academic achievement. Professional identity was however positively related to students' commitment to law school, particularly for students with lower achievement. Taken together, our results suggest no major role of the transition to higher education in the development of students' professional identity but do suggest that a strong professional identity helps students with staying committed to their study, specifically when facing academic difficulties.

Introduction

Over the last decade, students' transition to higher education (HE) has received extensive research attention. Urged by concerns about accessibility of HE, high levels of dropout, and student well-being, this research has identified challenges and requirements for success at the critical transition to HE stage (Brooman & Darwent, 2014; Coertjens et al., 2017). Beyond a focus on challenges and requirements for success, recent educational literature emphasises ontological aspects of the transition to HE, thereby conceptualising the transition as a stage of becoming (Christiaens et al., 2021; Gale & Parker, 2014). This means that besides learning how to study in HE, identity-related questions on who one is and who one wants to become are central for first year transitioning students (Lairio et al., 2013), and particularly for the large group of students who are in the developmental stage of emerging adulthood (Arnett, 2000).

Current literature on the transition to HE primarily focuses on students' learner and academic identities and the ways in which these identities are shaped in HE learning environments (Briggs et al., 2012; Ding & Curtis, 2021). Less research has been conducted on the development of a professional identity among first year transitioning students. A professional identity is the self that has been cultivated to perform competently and legitimately within a profession (Jensen & Jetten, 2016; Tomlinson & Jackson, 2021). This identity evolves throughout individuals' careers and encompasses an awareness of the attitudes, beliefs, and responsibilities of a particular profession (Reid et al., 2008; Trede et al., 2012). A strong professional identity among students functions as a bridge between education and employment in complex modern labour markets. HE institutions are therefore aiming to design curricula that support professional identity formation.

Professional identity has yet mainly been studied in the context of the HE-to-work transition (de Schepper et al., 2024; Trede et al., 2012). Few studies are situated at the transition to HE. The strong focus on the HE-to-work transition is unsurprising given the close relationship of professional identity with graduate employability (Jackson, 2016). Literature however suggests that researching professional identity at the transition to HE holds substantial potential for furthering understanding both of professional identity development and of the transition to HE. Entering a HE course programme, such as law, medicine or psychology, can be seen at the start of professional formation (Reid et al., 2008), and career transitions, including the transition to HE, are particularly formative stages in individuals' professional identity development (Ibarra, 1999). Furthermore, many students have profession-related motives for enrolment into HE course programmes (Gillis & Ryberg, 2021) and a professional identity may support them while studying in HE (Burlison et al., 2021; Jensen & Jetten, 2016). As such, developing students' professional identity, besides being an important objective in itself, may enhance first year achievement and retention.

In light of increased diversity on HE campuses, a particular important question on professional identity development is whether and how this process differs between students from diverse

backgrounds and whether students' sense of belonging in HE plays a role in this development (Sternszus et al., 2024). Understanding how diverse student populations develop a professional identities can provide insights into background-specific challenges and opportunities in HE (Jensen & Jetten, 2016; Sternszus et al., 2024). This is especially important for groups such as first-generation in HE (FGHE) students and students with migration backgrounds. These groups, whom we refer to as underrepresented minority (URM) students, may encounter additional barriers in HE such as cultural differences, discrimination, and a lack of role models in their field (Davis et al., 2023; Jensen & Jetten, 2016). To support a diverse student population with the development of a professional identity, inclusive learning environments where students experience a sense of belonging may therefore be crucial for students to be able to see themselves as a future professional (Sternszus et al., 2024). Current research however is inconclusive about the relationship between sense of belonging and professional identity development.

Based on the aforementioned, we have identified three objectives in our study. First, we aim to study students' levels of professional identity at two moments in the transition to HE, namely at the start of the academic year and at the end of the first semester, and variations therein according to students' generation in HE-status and migration background. Second, we aim to study the connection between students' sense of belonging in HE and their professional identity development. Third, we aim to study the influence of professional identity on students' achievement in the course programme and their commitment to their course programme. To address these objectives, we first provide a theoretical discussion on the role of professional identity at the transition to HE, after which we present an empirical study that was conducted among first year students who made the transition to law school.

Conceptualising professional identity development in HE

Studies on professional identity use a wide variety of definitions and theoretical frameworks that underly this concept (Trede et al., 2012). Our definition of professional identity as the self that has been cultivated to perform competently and legitimately within a profession follows prior studies conducted in the HE context (Tan et al., 2017; Tomlinson & Jackson, 2021; Vietze et al., 2024). We further advance the idea that students' professional identity is a type of social identity that is both dynamic and future oriented. A social identity is the extent to which individuals see themselves in terms of their membership to a social group, including professional communities (Hogg et al., 2004; Tajfel, 1978) and are embedded and formed within social contexts (Luhtanen & Crocker, 1992). Building on the social identity perspective, a professional identity is a socially based identity grounded in the extent to which individuals see themselves as members of professional communities (Pineda, 2024). This entails self-positioning in relation to the social environment of professional fields and their practices and communities (Davis et al., 2023; Tomlinson & Jackson, 2021).

Like other types of social identities, professional identity is dynamic, implying that its development occurs throughout individuals' careers (Tan et al., 2017). Furthermore, a unique aspect of students' professional identity is that it is future-oriented. For first-year law students, among whom our empirical study was conducted, this means that their professional identity is based on a constellation of attributes, values, motives, and experiences relating to how they see legal professionals and how they see themselves as future legal professionals (Field et al., 2013). As such, law students who enter the learning environment may already have an early professional identity, particularly if students enrol into law school with professionally-oriented motives (Reid et al., 2008; Sternszus et al., 2024). The transition to HE, then, is a crucial stage for the further development of this professional identity.

Professional identity at the transition to HE

Career transitions, including the transition to HE, are formative moments in the development of individuals' professional identities (Burlleson et al., 2021; Ibarra, 1999). Such transitions can be conceptualised using the transition cycle model of Nicholson (1990), which is often done when studying the transition in and from HE (Coertjens et al., 2017). This model distinguishes four subsequent stages of transition. These stages are 1) preparation, occurring before the actual moment of change, 2) encounter, capturing the moment of first confrontation with a new environment, 3) adjustment, referring to the process of adjusting behaviours to succeed in the new environment, and 4) stabilisation. This stabilisation stage enables individuals to realise potential in their current role and to prepare for future career transitions.

During career transitions and/or during early stages of academic or professional endeavours, feelings of self-doubt are often more intense, making individuals prone to the question whether their professional path really suits them (Bjorklund & Daly, 2021). Individuals answer these questions based on the processing of new internal and external feedback that provides new insights into their own preferences, values, skills, and abilities (Ibarra, 1999). Transitioning individuals evaluate their daily interactions in the new environment and their newly gained knowledge of the field. These evaluations are incorporated into prior experiences and knowledge, and as such contribute to the development of one's professional identity (Ibarra, 1999; Jensen & Jetten, 2016).

Transitions that happen early during individuals' career development, such as the transition to HE, may especially be relevant, as professional identities are most malleable early in one's career pathway (Bjorklund & Daly, 2021; Burlleson et al., 2021). Most students who enrol into a HE course programme already have certain ideas and expectations about the field in which they enrol and the professions that are related to their course programme (Reid et al., 2008; Sternszus et al., 2024). As such, they already have an early construction of a professional identity (Burlleson et al., 2021). These early constructions are, however, typically based on naïve perceptions of professional role requirements and often underdeveloped concepts of future

professional selves (Ibarra, 1999). When starting their education, students encounter the actual social practices that are characteristic of a chosen disciplinary field and become exposed to the world view, theories, skills, and languages embedded therein (Reid et al., 2008). This requires the student to re-evaluate their initial constructions of their professional identity.

In support of above theory, earlier research showed that students' professional identity develops over time while studying in HE (Burlleson et al., 2021; Trede et al., 2012). This development does however not necessarily imply growth. Burlleson et al. (2021) for instance found an overall decline in engineering identity, a concept closely related to professional identity, over the course of engineering students' first year in HE. They argue that new students may experience a "reality shock" when finding out that expectations of the profession students hold before students first encounter the profession through educational activities differ from students' actual experiences. The conclusion by Burlleson et al. (2021) that students' professional identities do not necessarily grow over the course of their studies is in line with the finding from Tomlinson and Jackson (2021). They showed that students at postgraduate level did not have a stronger professional identity than undergraduate students.

Underrepresented minority students in HE

Recent theoretical advances in the medical education literature emphasise a need to consider student background differences in theories of professional identity development in education (Sternszus et al., 2024). These authors argue that professional identity development cannot be separated from socio-political contexts in which it occurs. This includes social and structural inequities, such as systematic racism and discrimination, that could impact diverse students' experiences with professional fields.

With regard to URM and majority students' level of professional identity, one may however also formulate expectations based on the initial reasons for enrolment in HE course programmes. Earlier studies have shown that URM and majority students differ, in general, with regard to their motives for attending HE and enrolling into specific course programmes within the HE system. In the Netherlands, where this study was performed, students with a migration background and FGHE students more often choose a course programme based on career related motives, such as a high probability to find a (high-status) job after graduation and earning a high salary (ResearchNed, 2023). Qualitative research among URM students in Canada (Lehmann, 2009) and Denmark (Ulriksen et al., 2017) showed similar patterns. Asking students for reasons to attend HE, Lehmann (2009) found that FGHE students often insisted on the importance of learning useful skills, becoming credentialed, and gaining a competitive advantage on the labour market. Based on these results, he argues that FGHE students more often have strong utilitarian and instrumental orientations towards their education and approach university more often as a form of professional education and as preparation for a future career as compared to continuing-generation in HE (CGHE) students. Accordingly, FGHE students enrol more often

in course programmes related to professional-type occupations, to become a lawyer, doctor, or teacher (Lehmann, 2009; Spiegler & Bednarek, 2013).

Stronger professional orientations among FGHE students and students from migration backgrounds may also lead to a stronger professional identity among these student groups. Given the scarcity of prior research on this topic, we however do not formulate a hypothesis for this first research objective but firstly aim to explore to what extent differences in professional identity can be found according to students' background characteristics.

The role of sense of belonging

For the further development of diverse students' professional identity, it is important to create inclusive learning environments where students experience a sense of belonging (Sternszus et al., 2024). Following our conceptualisation of professional identity as a type of social identity, we propose that sense of belonging plays a significant role in students' professional identity development. In HE, sense of belonging refers to a feeling of connectedness with the HE community, that one is accepted by members of that community, and that one fits in (Hurtado & Carter, 1997; Walton et al., 2012).

Theories on identity development emphasise the importance of the social environment and social interactions within that environment (Jensen & Jetten, 2016; Sternszus et al., 2024). Social identity theory posits that the self is in important ways defined by social groups or social categories to which an individual belongs, such as a profession (Stryker & Burke, 2000). Through social interactions and engagement with the environment, norms, beliefs and values emerge that determine a person's identity (Jensen & Jetten, 2016). Social relationships and the extent to which people feel a sense of belonging to communities associated with specific identities have been shown to influence aspects of our identity and may also play a role in shaping professional identity.

Newly enrolled students may re-evaluate their professional identity, based on their experiences and sense of belonging within the HE environment. Belonging and identity are closely related, as relationships that promote a sense of belonging give people a sense of purpose and meaning in life and motivate people for actions, interests, and pursuits (Walton et al., 2012). Osterman (2000) argued that when students experience a sense of belonging, they are more likely to establish a stronger professional identity. This is supported by Hazari et al. (2020) who found that for women physicists in their fourth year in HE, a sense of belonging supported their belief of seeing themselves as a physics person. We therefore expect the following regarding the relationship between sense of belonging and professional identity:

Hypothesis 1: Students' sense of belonging in higher education positively influences their professional identity development at the transition to HE.

Influence on achievement and retention

Several authors have argued that professional identity development is important already during early stages of students' trajectories in HE, as it helps students to achieve and persist (Jensen & Jetten, 2016; Tomlinson & Jackson, 2021). Identification with a chosen profession, related to students' course programme in HE and to students' future self as professional (Higgins et al., 1990), allows students to imagine their future, to visualise themselves in the field and to understand who they are and what they are aspiring to, which can be a source of motivation and goal setting for studying in HE (Jensen & Jetten, 2016; Reid et al., 2008).

In an interview study among undergraduate students, Jensen and Jetten (2016) found that students who could not identify with their chosen profession became disengaged and lacked motivation, which negatively impacted self-confidence, goal setting and academic success. A similar result was found in a study among nursing students, indicating that a common reason for students to stay in the study programme was their commitment to become a member of the nursing profession, which helped to overcome difficulties during their studies (Glogowska et al., 2007). Based on these findings, we expect that a strong professional identity helps students to achieve and commit in HE:

Hypothesis 2a: Students' level of professional identity at the transition to HE is positively related to academic achievement (i.e., course grades).

Hypothesis 2b: Students' level of professional identity at the transition to HE is positively related to their commitment to their course programme (e.g., law).

Additionally, following Glogowska et al. (2007) and Jensen and Jetten (2016), we explore whether variations occur in the expected effect of professional identity on achievement and commitment. Specifically, we explore whether the relationship between professional identity and achievement and commitment differs between students with an URM background and students with a majority background. Moreover, we explore whether professional identity moderates a relationship between achievement and commitment, as a professional identity might be particularly important for low achieving students' commitment to law school.

The current study

In this study we aim to contribute to the literature on professional identity development in HE by studying this identity at the transition to HE. To this end, we examine several antecedents and consequences of law students' legal professional identity at the transition to law school. Firstly, we explore levels of professional identity, and variations therein, at two stages of the transition, i.e. at the start of the academic year (September) and at the end of the first semester (January). We explore both variations in professional identity across these two timepoints and

variations between groups of students (i.e., URM students and majority students). Secondly, we analyse the effect of sense of belonging on professional identity, testing the hypothesis that a sense of belonging in the law course programme positively influences the development of professional identity (Hypothesis 1). Thirdly, we analyse the effect of professional identity on achievement in and commitment to the law course programme (Hypothesis 2a and 2b).

Method

Procedure and sample

Data for the present study were collected during the academic year 2021-2022 among first year students at an undergraduate law course programme in the Netherlands. Survey data were collected at two time points at the transition to HE: at the start of the first semester in September (T1) and at the end of the first semester in January (T2). Most students filled out the survey during tutorial group meetings. Before students filled out the surveys, the tutors who guided the tutorial group meetings explained the general study aims and procedures and emphasised that participation was voluntary. In total, 198 students participated in the study at T1, 124 students participated at T2, and 57 students participated at both timepoints. Sample characteristics, including information about participants' background characteristics, are presented in Table 1. Ethical approval was granted by the university's ethical committee for this procedure (reference number: 21-083).

Table 1 Background characteristics of participants across waves.

	Sample T1 (n=198)	Sample T2 (n=124)	Sample T1-T2 (n=57)
Generation-status			
<i>CGHE</i>	118	87	36
<i>FGHE</i>	80	39	21
Migration background			
<i>No</i>	146	85	43
<i>Yes</i>	52	36	14
Underrepresented ^a			
<i>Majority</i>	104	70	32
<i>Underrepresented</i>	94	54	25
Gender			
<i>Male</i>	72	39	43
<i>Female</i>	126	85	14

Note. ^a Underrepresented students are students who have either or both a FGHE- and migration background. Majority students have a CHGE background and no migration background.

Measures

Professional identity was measured by an 8-item scale that was originally developed by Bennett (2010) and adapted to the HE undergraduate context by Tomlinson and Jackson (2021). Example items are 'I feel I share characteristics with other members of the law profession' and 'Becoming a member of the law profession is important to me.' Answer categories ranged from 1 ('Not true at all') to 5 ('Completely true'). At both timepoints, Cronbach's alphas had values of .86 both at T1 and at T2, indicating good reliability.

Sense of belonging was measured with a 6-item scale ($\alpha_{T1} = .74$; $\alpha_{T2} = .72$) developed by Meeuwisse et al. (2010) and adapted for the current study to reflect students' sense of belonging in their educational programme, i.e. law school. Example items are 'I enjoy participating in the educational meetings of my educational programme' and 'I feel at home at my educational programme', with the educational programme referring to the law programme in which students were enrolled. Students rated each item on a 5-point Likert scale (1 = 'Not true at all', 5 = 'Completely true').

Academic achievement was operationalised as first-year grade point average (FYGPA) and was retrieved from the university's educational research database. Grades for separate courses were given on a scale from 1 (lowest) to 10 (highest). FYGPA was calculated as the average of the final grade of all courses, weighted by the credit hours (ECTS) assigned to these courses.

Commitment to law school was measured at T2 by three items asking students on a 5-point Likert scale about their certainty of their intention to (1) continue to the second year of law school, (2) finish the bachelor programme in law, and (3) continue to the master programme in law after finishing the bachelor programme. Cronbach's alpha of the commitment scale is .87.

Generation-status in HE was measured via the educational background of students' parents, derived from the university's educational research database. Students whose parents did not study in HE (ISCED 2011-level 6 or lower) were defined as FGHE-students (Spiegler & Bednarek, 2013). Generation-status in HE was a dichotomous variable with value 0 for continuing-generation in HE (CGHE)-students and value 1 for FGHE-students

Migration background. Students' migration background was retrieved from the university's educational research database, which includes information on students' migration background according to the traditional definition of Statistics Netherlands (2022). Students were categorised as having a migration background if they migrated themselves or if at least one of their parents migrated to the Netherlands. Migration background was a dichotomous variable with 0 students with no migration background and 1 for students with a migration background.

URM-status was measured based on the generation-status and migration background variables and was a dichotomous variable. Students who were neither FGHE nor had a

migration background were categorised as majority students and were assigned a score of 0. Students who were FGHE and/or had a migration background were categorised as URM-students with a score of 1.

Analysis

Our analyses consisted of multiple steps. First, we conducted descriptive analyses, including intercorrelations between the study's core variables. Next, group differences in professional identity and sense of belonging were analysed, in line with the first research aim. Specifically, we compared sense of belonging and professional identity levels at T1 and T2 between FGHE and CGHE students and between students with a migration background and without a migration background. Next to correlation analysis of sense of belonging and professional identity at T1 and T2, we tested Hypothesis 1 by conducting mixed ANOVA analysis. In this analysis, we tested whether sense of belonging predicted change in professional identity from T1 to T2.

Hypotheses 2a and 2b were tested by hierarchical regression analysis using data from the T2 sample with FYGPA and commitment to law school as outcome variables. In these models, we first included control variables to test whether professional identity incrementally explains variance in achievement and commitment over several common predictors of these outcomes. In both achievement and commitment models, we included gender, pre-university achievement, underrepresented minority-status, and sense of belonging as control variables. In the commitment model, we further included academic achievement after the first semester as a control variable. Lastly, we included one interaction term in the achievement model (URM-status*professional identity) and two interactions terms in the commitment model (URM-status*professional identity and Achievement in first semester*professional identity).

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Results

Descriptive statistics and group differences

Table 2 presents bivariate correlations between the key variables used in this study and descriptive statistics of the scales (reliabilities, means, standard deviations) for the two waves. The average scores on professional identity had similar values at T1 in September ($M = 3.62$, $SD = 0.64$) and at T2 in January ($M = 3.64$, $SD = 0.64$). The average score of sense of belonging was slightly higher at T1 ($M = 4.00$, $SD = 0.60$) as compared to T2 ($M = 3.91$, $SD = 0.83$), although this difference was not significant. The bivariate correlations further show that professional identity and sense of belonging related positively to each other both at T1 ($r = .40$, $p < .001$) and at T2 ($r = .47$, $p < .001$) and that professional identity and sense of belonging both related

positively to students' commitment to law school ($r = .49, p < .001$). Further, regarding academic achievement, Table 2 shows positive intercorrelations between sense of belonging and first year GPA. Lastly, negative intercorrelations were found for generation-status and URM-status with grade achievement, implying that FGHE students and URM students gained lower grades.

A further analysis of group differences in professional identity and sense of belonging along the dimensions of generation-status and migration background is presented in Table 3. At T1, no group differences were found on professional identity. For sense of belonging, a difference at T1 was found for migration background. At this timepoint, students with a migration background reported a significantly lower sense of belonging in law school as compared to students without a migration background, with a medium-sized effect size of $d = -0.47$. At T2, students with a migration background reported a stronger professional identity than students without a migration background, with a corresponding d -value of 0.46 indicating a medium-to-large effect. No group differences were found on sense of belonging at T2. Table 3 further indicates no differences based on generation-status in either sense of belonging nor professional identity at both timepoints.

Effect of sense of belonging on professional identity development

Besides cross-sectional intercorrelations between sense of belonging and professional identity using the T1 and T2 sample, we conducted mixed ANOVA analysis to examine the influence of sense of belonging on change in professional identity from T1 to T2. For this analysis, we used the repeated measures sample, including students who participated both at T1 and T2. This analysis revealed a significant and positive main effect of sense of belonging at T2 on professional identity ($F(1,51) = 14.89, p < .001, \eta^2 = 0.17$), indicating that students with a higher sense of belonging in law school also had a stronger professional identity. There was no significant effect of time ($F(1, 51) = 0.04, p = .846, \eta^2 = 0.00$). On average, professional identity did thus not change from T1 to T2. The interaction between sense of belonging at T2 and time was however significant ($F(1,51) = 12.85, p < .001, \eta^2 = 0.07$). Provided that professional identity did not significantly change from T1 to T2, this likely implies that the association between sense of belonging and professional identity is stronger for identity levels at T2 as compared to identity levels at T1.

Table 2 Descriptive statistics and intercorrelations between key variables.

	$\alpha(k)$	M	SD	1	2	3	4	5	6	7	8	9
September (T1; N = 198)												
1 Professional identity T1	.86 (8)	3.62	0.64	(-)	.40***	.02	.01	.02	-.05			
2 Sense of belonging T1	.74 (6)	4.00	0.60	(-)	(-)	-.13	-.20**	-.12	-.17*			
3 Generation-status				(-)	(-)	(-)	.40***	.87***	-.04			
4 Migration background				(-)	(-)	(-)	(-)	.63***	-.09			
5 URM-status				(-)	(-)	(-)	(-)	(-)	-.09			
6 Gender				(-)	(-)	(-)	(-)	(-)	(-)			
January (T2; N = 124)												
1 Professional identity T2	.86 (8)	3.64	0.64	(-)	.47***	.49***	.17	.14	.03	.20*	.11	-.04
2 Sense of belonging T2	.72 (6)	3.91	0.60	(-)	(-)	.49***	.18*	.18*	.04	-.07	-.09	-.15
3 Commitment to law	.87 (3)	4.43	0.83	(-)	(-)	(-)	.27**	.28**	.06	.11	.09	-.09
4 First semester GPA		6.28	0.92	(-)	(-)	(-)	(-)	.94***	-.21*	-.09	-.18*	.01
5 First year GPA		6.19	1.11	(-)	(-)	(-)	(-)	(-)	-.25**	-.09	-.21*	-.05
6 Generation-status				(-)	(-)	(-)	(-)	(-)	(-)	.32**	.74***	.09
7 Migration background				(-)	(-)	(-)	(-)	(-)	(-)	(-)	.73***	-.05
8 URM-status				(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	.07
9 Gender				(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)	(-)

Note. *** $p < .001$; ** $p < .01$; * $p < .05$.
 k refers to number of items.

Table 3 Group differences in professional identity and sense of belonging.

		Group 1 ^a		Group 2 ^a				d-value
		M	SD	M	SD	df	t-value	
Professional identity T1	Generation-status	3.61	0.66	3.63	0.61	196	-0.268	0.04
	Migration backgr.	3.62	0.62	3.62	0.69	196	-0.914	0.01
Sense of belonging T1	Generation-status	4.06	0.63	3.91	0.56	196	1.815	-0.26
	Migration backgr.	4.07	0.63	3.80	0.53	196	2.868**	-0.47
Professional identity T2	Generation-status	3.62	0.66	3.67	0.61	122	-0.373	0.07
	Migration backgr.	3.56	0.68	3.84	0.51	122	-2.303*	0.46
Sense of belonging T2	Generation-status	3.90	0.66	3.95	0.45	122	-0.574	0.10
	Migration backgr.	3.94	0.63	3.85	0.54	122	0.791	-0.16

Note. *** $p < .001$; ** $p < .01$; * $p < .05$

^a Group 1 are CGHE students and students without migration background. Group 2 are FGHE students and students with a migration background.

Academic achievement and commitment to law school

Regression models of professional identity on first year academic achievement (FYGPA) and commitment to law school are presented in Table 4. Models 1 include effects of the control variables on achievement (FYGPA) and commitment, Models 2 include the main effect of professional identity, net of the effects of the control variables, and Models 3 include the interaction between professional identity and URM-status (for achievement and commitment) and the interaction between professional identity and first semester academic achievement (for commitment only).

For first year academic achievement, Model 1 indicates positive and significant effects of pu-GPA and sense of belonging and a negative significant effect of URM-status. Students who achieved higher academically before entering law school and students with a higher level of sense of belonging thus received higher grades during their first year. URM students in HE received lower grades during their first year. Model 2 shows that professional identity has no significant effect on achievement, leading us to reject Hypothesis 2a Furthermore, Model 3 indicates the interaction effect between professional identity and URM-status is nonsignificant. For both URM- and majority students, the relationship between professional identity and achievement is thus nonsignificant.

Table 4 Regression models of professional identity on achievement and commitment.

	Achievement	Commitment
Model 1		
Gender	0.11 (0.19)	0.03 (0.14)
pu-GPA		
Low	<i>Ref.</i>	<i>Ref.</i>
Middle	0.51 (0.20)*	0.14 (0.15)
High	1.69 (0.31)***	0.06 (0.25)
URM	-0.36 (0.18)*	0.25 (0.13)
Sense of Belonging	0.34 (0.15)*	0.56 (0.11)***
GPA semester 1	(-)	0.17 (0.08)*
Explained variance (R^2)	0.27	0.27
Model 2		
Gender	0.09 (0.19)	-0.00 (0.14)
pu-GPA		
Low	<i>Ref.</i>	<i>Ref.</i>
Middle	0.49 (0.20)*	0.12 (0.15)
High	0.49 (0.20)***	0.11 (0.24)
URM	-0.40 (0.18)*	0.19 (0.13)
Sense of Belonging	0.24 (0.17)	0.42 (0.12)***
GPA semester 1	(-)	0.14 (0.08)
Professional ID	0.21 (0.16)	0.31 (0.12)**
Explained variance (R^2)	0.27	0.32
Model 3		
Male	0.09 (0.20)	-0.02 (0.14)
pu-GPA		
Low	<i>Ref.</i>	<i>Ref.</i>
Middle	0.49 (0.20)*	0.10 (0.14)
High	1.69 (0.32)***	0.03 (0.24)
URM	-0.16 (1.11)	0.33 (0.80)
Sense of Belonging	0.23 (0.17)	0.39 (0.12)**
GPA semester 1	(-)	0.97 (0.38)*
Professional ID	0.23 (0.20)	1.79 (0.67)**
Professional ID * URM	-0.07 (0.30)	-0.05 (0.22)
Professional ID*GPA semester 1	(-)	-0.23 (0.10)*
Explained variance (R^2)	0.27	0.35

Note. *** $p < .001$; ** $p < .01$; * $p < .05$

For commitment, Model 1 indicates positive effects of sense of belonging and GPA after semester 1 on students' commitment to law school. No effects were found of pu-GPA and gender. Model 2 further shows that professional identity is significantly and positively related to commitment to law school, when controlled for gender, pu-GPA, sense of belonging, and GPA after semester 1. Students with a stronger professional identity thus reported stronger committed to law school, which supports our Hypothesis 2b. Lastly, similar to Model 3 of achievement, no interaction effect between professional identity and URM-status was found. Model 3 does however show a significant negative interaction effect between professional identity and GPA semester 1, meaning that the positive association between early academic achievement and law school commitment is less strong for students who have a strong legal professional identity.

Discussion and conclusion

In the present study, we investigated first year students' professional identity development at the transition to law school. In doing so, we had three objectives: (1) to examine students' strength of professional identity at two critical moments at the transition to HE (i.e., at the start of the academic year and at the end of the first semester) and differences in professional identity according to students' generation in HE-status and migration background, (2) to study the relationship between sense of belonging and professional identity development, and (3) to study the relationship of professional identity with academic achievement and commitment to law school.

In sum, we found that professional identity levels do not vary over time, between the start of the academic year and at the end of the first semester. Our results do however reveal differences in professional identity between student groups, depending on sense of belonging in law school and migration background. Students with a higher sense of belonging reported stronger professional identity, both at the start of the academic year and at the end of the first semester, and students with a migration background reported a stronger professional identity, but only at the end of the first semester. In contrast, students with a migration background reported a lower sense of belonging at the start of the academic year. Our results did not reveal differences in professional identity or sense of belonging based on students' generation-status. Lastly, regarding outcomes of professional identity, we did not find an effect on academic achievement. Our results did show that a higher professional identity was related to stronger commitment to finishing law school.

Previous studies on the role of identity at the transition to HE primarily focused on student identities (Briggs et al., 2012; Ding & Curtis, 2021), while studies on professional identity development in HE were yet mainly situated at the education-to-work transition (de Schepper et al., 2024; Trede et al., 2012). Our research adds to this previous work by providing evidence for the relevance of professional identity at the transition to HE. Importantly however, while

theory (Ibarra, 1999; Nicholson, 1990) and research (Burlleson et al., 2021; Gillis & Ryberg, 2021) both suggest a role of the transition to HE in the development of professional identity, our results suggest that professional identity primarily plays a role as a supportive factor at the transition to HE. This is indicated by the positive effect of professional identity on students' commitment to law school. That this effect is stronger for students with lower grades is in line with suggestions made in the literature that a strong professional identity serves as a protective factor that keeps students motivated to persist, and particularly when experiencing difficulties (Glagowska et al., 2007; Jensen & Jetten, 2016). This finding thus highlights a protective role of professional identity in buffering against the challenges that students face in HE.

However, our results do not provide evidence for the transition to HE as a developmental stage for professional identity. Average levels of professional identity did not vary over the two timepoints and the repeated-measure analysis did not show an effect of sense of belonging on professional identity change. Prior research of professional identity development among first year engineering students showed a clear decline in professional identity at the transition to HE (Burlleson et al., 2021). Supposedly, these students experienced a 'reality shock' while encountering the actual practices of their chosen profession (Nicholson, 1990). Our findings are however comparable with those of Tomlinson and Jackson (2021), who found no difference in professional identity between first and further year students enrolled in various course programmes.

The positive association between students' sense of belonging in law school and their legal professional identity is in line with theory and previous research indicating a link between individuals' cognitive evaluations of their place within specific social environments and related social identifications (Jensen & Jetten, 2016; Walker & Lynn, 2013). Our results show that strong correlations exist between students' sense of belonging in law school and their professional identity. The study does however not find an effect of sense of belonging on professional identity over time. The absence of this effect implies that our study does not provide evidence for socialisation models of professional identity (Sternszus et al., 2024). These models, developed in the context of medical education, emphasise a role of sense of belonging in strengthening students' professional identity in the HE learning environment.

A possible explanation for the absence of variance in professional identity over time and for the absence of an effect of sense of belonging on professional identity development might be that the two timepoints at which we collected data (i.e., September (T1) and January (T2)) were too close to each other to detect meaningful change in students' legal professional identity. Based on transition theory (Ibarra, 1999; Nicholson, 1990) and prior research of professional identity early in the first year of HE (Burlleson et al., 2021), we expected that the encounter of professional practices at the transition to HE would lead to change in average levels of professional identity, as this encounter puts students' expectations to the test. However, no average differences in professional identity were found over time. Additionally, the initial

stages of HE might involve a stage where students are primarily focused on encountering and adjusting in the new academic environment rather than actively engaging with professional identity formation. Future research could benefit from extending the duration between data collection points.

Regarding differences in students' professional identity and sense of belonging between student groups, based on background characteristics, our results both contrast and corroborate previous studies. Previous research and theory mainly pointed to potential differences based on generation in HE-status, due to unequal access to relevant social and cultural capital (Jensen & Jetten, 2016; Tomlinson & Jackson, 2021). We however did not find differences in professional identity according to generation in HE-status, but instead found enhanced professional identity among students with a migration background, which is a rather novel finding. A possible explanation for this difference in average levels of professional identity might be that students with a migration background, in the Dutch HE context, more often enrol into HE course programmes with professionally oriented motives (ResearchNed, 2023). Interestingly however, a significant difference in professional identity based on migration background was absent at the start of the academic year but only emerged in January. Future research should be conducted on this issue for replication and explanations for these findings.

Limitations and future directions

One of the limitations of our study, which is already shortly discussed above, is the use of only two timepoints for data collection. This timeframe may not completely and adequately capture the dynamic and evolving nature of professional identity development (Trede et al., 2012). To gain a better understanding of professional identity at the transition to HE, future research should use longitudinal designs with multiple data collection points over an extended period, for instance the period from before enrolment towards the end of the first academic year, capturing the complete transition to HE (Coertjens et al., 2017; Nicholson, 1990). This approach would allow for the observation of longer-term trends and the identification of critical phases in the development of professional identity.

A second limitation primarily relates to our investigation of the link between sense of belonging and professional identity. These concepts are conceptually closely related as they both concern students' cognitive evaluation within a particular social setting or social group. Also, both concepts were measured by survey questions, which could lead to risks of identifying spurious correlations because of common method variance (Johnson et al., 2011; Kreutzmann et al., 2018). A possible solution to this issue could be the adoption of a social network approach. By combining a social network approach with more objective information about the social structure of course programmes, researchers can gain a clearer understanding of how students' relationships interactions within their academic environment influence their sense of belonging and professional identity. This method would help mitigate

the risks associated with self-reported data and provide a more robust framework for studying these complex constructs.

A third limitation concerns the sample of our study, which consisted of students from a single law school and may therefore not generalise to other (law) course programmes. At the same time, the sample that we used was relatively diverse in terms of students' backgrounds, due to the heterogeneity of the law school's student population, which allowed us to study diverse student groups. Still, this too may not fully represent the diversity of experiences and backgrounds found in other HE institutions. Future research should aim to include a more diverse sample, encompassing different types of HE institutions and a broader range of demographic characteristics, to enhance the external validity of the results.

In summary, our study highlights a relevance for professional identity at the transition to HE, by positively influencing students' commitment to the course programme and that professional identity is related to students' sense of belonging in HE. Particularly for students with a migration background, these results appear to be relevant for their success at the transition to HE, as this group of students reports a stronger professional identity as compared to students without a migration background. These findings suggest that professional identity can already play a role in retention and success of diverse student populations at the start of students' academic careers in HE. It is thus important to support students with the development of their professional identity. For future research, it is important to adopt longitudinal designs and incorporate objective measures to build on these insights and further our understanding of professional identity development in HE.



Chapter 6

Belonging and becoming in peer networks: A longitudinal social network study in higher education⁷

⁷ This chapter has been submitted as:

van Lamoen, P. M. , Meeuwisse, M., Arends, L. R., Severiens, S. E., & Brouwer, J. (submitted). Belonging and becoming in peer networks: A longitudinal social network study in higher education.

Abstract

Small-group, student-centred, and problem-driven learning environments can support students in the transition to higher education (HE) by providing a proximal environment that encourages development of supportive peer networks and enhances sense of belonging and professional identity development. This study aims to investigate the dynamic and mutual development of sense of belonging, professional identity, and peer networks. Social network and individual data are obtained from 247 first-year students in three waves during their first semester in a psychology course programme embedded in a problem-based learning environment. Using random-intercept cross-lagged panel models, we find that sense of belonging early in the academic year predicts professional identity development at a later stage. Stochastic actor-oriented models show a co-evolution of sense of belonging and students' friendship and help-seeking connections. Specifically, sense of belonging not only appears to be influenced by students' social relations in HE, as is often assumed in current research, but also seems to enhance students' activity with building relationships. Findings further indicate that students prefer help-seeking ties with students who have a similar professional identity.

Introduction

Across recent decades, higher education (HE) institutes have increasingly implemented small-group, student-centred, and problem-driven learning environments to support students at the transition to HE and improve first-year student success (Brouwer et al., 2022; Severiens et al., 2015; Wijnia et al., 2024). Common examples of such learning environments are those that employ problem-based, project-based, and case-based teaching approaches (Wijnia et al., 2024). Within these learning environments, students' active role in learning and knowledge construction is emphasised, as students collaborate while attempting to solve real-world problems (Loyens et al., 2023). These features of HE learning environments are thought to support students in several ways, including facilitating their sense of belonging (Meeuwisse et al., 2010) and aiding in the development of an early professional identity (Tan et al., 2016).

Both sense of belonging and professional identity are highlighted in HE literature as important factors of student success (Strayhorn, 2018; Trede et al., 2012). Sense of belonging refers to students' feelings of connectedness with the HE community, that one is accepted and that one fits in (Dias-Broens et al., 2024; Walton & Cohen, 2011). The cultivation of students' sense of belonging is central in many HE institutes' strategies to promote student success, wellbeing, and motivation within HE course programmes (Allen et al., 2024; Gopalan & Brady, 2020). Feeling a sense of belonging can motivate students and engage them more deeply to their studies (Yeager et al., 2016). This appears particularly relevant for students who newly encounter and adjust to the HE learning environment at the transition to HE (Strayhorn, 2018; van Herpen et al., 2020), as well as for student groups who are underrepresented in HE contexts (Strayhorn, 2018; Walton & Cohen, 2011).

Professional identity is the self that has been cultivated to perform competently and legitimately within a profession and encompasses an awareness of and connection to the values, attitudes and beliefs of particular professional fields (Tomlinson & Jackson, 2021; Trede et al., 2012). Whereas sense of belonging thus refers to students' subjective connection with the HE learning environment and its communities, professional identity refers to students' connection with their future work field, related to their course programme (e.g., psychology, medicine, engineering; Reid et al., 2008). Students' professional identity is emphasised as crucial for achieving career success at the education-to-work transition (Jensen & Jetten, 2016; Tomlinson & Jackson, 2021) and promotes academic adjustment and retention by enhancing study motivation and engagement (Burlison et al., 2021; Jensen & Jetten, 2016).

Given their importance for success in HE, it is important to investigate how sense of belonging and professional identity develop within students. Theory and research emphasise that both concepts are dynamic and continuously evolving in response to students' experiences and interactions in the HE learning environment (Ahn & Davis, 2020; Jensen & Jetten, 2016). To date, few studies have however addressed how sense of belonging and professional identity develop longitudinally during students' trajectories in HE and how students' peers play a

role in this development. Addressing these gaps can provide important insights into the developmental process of sense of belonging and professional identity, and inform the design of small-group, student-centred, and problem-driven learning environments, in which learning is socially situated and occurs through interactions with peers (Brouwer et al., 2019; Wijnia et al., 2024). This study addresses these gaps by studying sense of belonging and professional identity development over time at the transition to HE, thereby questioning to what extent belongingness and professional identity contribute to each other's development, and to what extent peer relationships contribute to the development of both concepts.

Sense of belonging and professional identity in higher education

Research on sense of belonging and professional identity within small-group, student-centred, and problem-driven learning environments often considers their development as distinct processes. Small-groups and student-centredness are primarily emphasised as enhancing students' sense of belonging (Brouwer et al., 2019; Severiens et al., 2015), as belongingness depends to a large extent on students' social relationships within HE contexts (Ahn & Davis, 2020; Anistranski & Brown, 2023; Gilani & Thomas, 2025). The proximal context of small groups, where students often meet, collaborate, and get to know each other could foster the development of supportive peer relationships and hence the development of a sense of belonging (Brouwer et al., 2019; Meeuwisse et al., 2010). Whereas the social aspect of small-group environments is thought to enhance belongingness, the integration of real-world problems in the learning process is expected to facilitate professional identity development. Such problems could help students with connecting theory to their future profession, thereby making learning more relevant for students and aiding them with envisioning themselves as future professionals (Schmidt et al., 2011; Tan et al., 2016). As such, the development of a sense of belonging and professional identity appear to be separate processes.

Findings from recent studies in STEM education however suggest interrelatedness of sense of belonging and professional identity (Bahnsen et al., 2025; Chen et al., 2021; Davis et al., 2023; Polmear et al., 2024). These studies take a sociocultural perspective on identity development within educational contexts (Holland et al., 1998) and particularly focus on STEM identification among underrepresented student groups, such as ethnic minority students and women. For these students to come to see themselves as members of the STEM community it appears particularly relevant to feel treated as valued by other community members in relevant contexts, and perceive a personal fit with this context and their communities (Bahnsen et al., 2025; Davis et al., 2023). For students, who's primary STEM-context is the HE learning environment, it may therefore be important to experience a sense of belonging in this learning environment. In a similar vein, Sternszus et al. (2024) assert in a theoretical article that a sense of belonging to the community of students and teachers in medical school is fundamental to the professional identity development of aspiring doctors. They argue that perceptions of

exclusion in the learning environment, as opposed to belonging, can have detrimental impact on students' ability to recognise themselves within the profession.

The development of both students' sense of belonging and professional identity is a dynamic process that occurs throughout students' academic trajectories in HE. Within this developmental process, the transition to HE is regarded a particularly formative stage (Gale & Parker, 2014). At this stage, students commence their studies in course programmes that are often related to professional fields, such as psychology, law, and medicine. Transitioning students thus have their first encounter with the HE learning environment and their communities (Coertjens et al., 2017) and with the culture and practices of the professional fields related to their course of study (Reid et al., 2008). Burleson et al. (2021) showed that this encounter at the transition to HE could result in a decline of students' professional identity, particularly if students do not sense a personal 'fit' with the course programme. Their measure of fit was however concerned with students' perceptions of having the right skills and abilities to succeed in their major. Whether students' sense of belonging plays a similar role in professional identity development at the transition to HE has to our knowledge not been examined yet.

The role of peers in sense of belonging and professional identity development

From above theory, it follows that community plays an important role in both students' sense of belonging and professional identity development (Anistranski & Brown, 2023; Chen et al., 2021; Davis et al., 2023; Jensen & Jetten, 2015). At the transition to HE this community consists primarily of peers and teachers (Brouwer et al., 2019; Jensen & Jetten, 2015). Within small-group, student-centred, and problem-driven learning environments, peers are particularly significant, as their interactions and collaborations are integral to the learning process, offering vital resources like knowledge, information, and support (Wijnia et al., 2011). For instance, friendships with peers provide emotional support and social comfort in the learning environment and peers one could approach for academic help are a major source of advice and information (Buote et al., 2007; Mishra, 2020). The transition to HE is an important developmental stage for supportive friendship and help-seeking connections, as students then firstly meet and gradually build relationships (Stadtfeld et al., 2019). In turn, such networks of relationships could play a role in cultivating students' sense of belonging and professional identity.

The mutual and longitudinal process of emerging and changing peer networks and developing individual attributes, such as sense of belonging and professional identity, is called the co-evolution process (Steglich et al., 2010). Studying this process requires longitudinal social network data that allow for disentanglement of social selection and social influence, which are both drivers of change in the network structure (e.g., who is connected with whom?) or in individual attributes (e.g., how strong are individual students' sense of belonging and

professional identity?). Social selection refers to the process where individuals choose to form relationships based on their own and/or others' behaviours, attitudes, and beliefs. Social influence refers to the process where individuals' behaviours, attitudes or beliefs are affected by social connections. Proximity (a tendency to preferentially select nearby others) and homophily (a tendency to preferentially select others who are similar to oneself) are important mechanisms in the social selection process of friendship and help-seeking ties (McPherson et al., 2001; Steglich et al., 2010). Social influence in friendship and help-seeking ties occurs through processes such as imitation, contagion, assimilation, and social control processes among students (Brouwer et al., 2022; Friedkin, 1998). For instance, friendships enable students to observe, imitate, or learn behaviours from their peers.

Co-evolution of peer networks and sense of belonging

The role of peers in the cultivation of students' sense of belonging is often researched, and repeatedly this research finds a strong connection between social relationships in HE and sense of belonging (Anistranski & Brown, 2023; Hausmann et al., 2009; Meeuwisse et al., 2010; Walton & Cohen, 2011). Early work on this subject showed that positive interactions with peers in the learning environment, and particularly friendships, enhance the development of a sense of belonging (Hurtado & Carter, 1997) and subsequent research has replicated this finding repeatedly (Allen et al., 2021; Gilani & Thomas, 2025). Having several qualitative ties in the HE learning environment provides social support, shared experiences, and a sense of community, all of which are crucial for fostering a strong sense of belonging among students (Anistranski & Brown, 2023).

Next to a positive influence of the presence of qualitative social ties in the HE environment on sense of belonging, related students (i.e., friends, helpers) may influence each other's belongingness in the learning environment. Social cognitive theory (Bandura, 1986, 2001) posits that social interactions with and observation of others shape individual attributes, including skills, beliefs, and behaviours. Students who experience more belongingness might explicitly share or implicitly express more positive thoughts and experiences regarding the course programme and their place in it. Conversely, students who have negative feelings about the course programme and have a low sense of belonging might signal these negative feelings to related peers. Exposure to explicit or implicit expressions of belongingness in HE might thus shape students' sense of belonging implying that belongingness is transmitted in peer networks through social influence processes.

Sense of belonging might also influence selection processes in peer networks in two expected ways. Firstly, although current studies primarily emphasise that social relationships in HE influence belongingness, it may just as well be the case that students with a heightened sense of belonging are more active with building relationships. Belongingness can be understood as a cognitive evaluation of one's place in a social environment that leads to attitudinal and

behavioural responses, including the initiation of social relationships within that environment (Strayhorn, 2018; Wilson et al., 2015). Consequently, students with a higher sense of belonging might have more friendship and help-seeking ties due to their pro-activity in forming these ties, instead of (or additional to) an influence of these ties on belongingness. Secondly, homophily processes suggest that students are inclined to form relationships with others who experience similar belongingness.

Co-evolution of peer networks and professional identity

As compared to sense of belonging, research on the development of professional identity through peer connections is scarce. Studies however show that social capital, which students derive through their social relationships in the HE learning environment, is important in the development of a professional identity (Burlison et al., 2021; Jensen & Jetten, 2015; Tomlinson & Jackson, 2021). A question that remains unanswered is whether peers can provide the relevant social capital for professional identity formation. From an interview study among HE students, Jensen and Jetten (2015) concluded that faculty relations facilitated professional identity development, and that peer relationships, and particularly friendships, were mainly important for students' sense of belonging.

Yet, some influence of peer relationships on professional identity might be expected, particularly in the help-seeking network. Firstly, in a later study on professional identity development, Jensen and Jetten (2018) emphasised the importance of interpersonal recognition, arguing that students achieve a professional identity through their recognition or abilities and achievements. Although teachers might particularly be a source of relevant recognition for professional identity development, peers might offer relevant recognition of abilities and achievements by asking for academic support. As such, being asked for help by peers might enhance professional identity development. Secondly, peer networks might influence professional identity development through social influence, comparable to the process of transmission of belongingness in peer networks, as would be expected by social cognitive theory (Bandura, 1986, 2001). Connected students' professional identity might thus become more similar over time.

Regarding social selection, homophily processes and social identity theory suggests that professional identity plays a role in the formation of peer networks (Tajfel & Turner, 2004; Thiele et al., 2018). Social identities play a major role in homophily processes as these types of identities lead individuals to prefer interactions with peers who reflect their own professional values and norms. Lastly, a strong professional identity might make students more comfortable in seeking help from peers.

The current study

This study aims to investigate how sense of belonging, professional identity, and peer networks develop within the context of a small-group, student-centred, and problem-driven learning environment. Therefore, we address the following research questions: (1) To what extent do students' sense of belonging in HE and professional identity mutually contribute to each other's development at the transition to HE? (2) What is the role of sense of belonging and professional identity in students' selection process of friends and help-seeking? (3) To what extent are socially connected students in a course programme influenced by each other's sense of belonging and professional identity? By addressing these questions, we attempt to provide new insights into the longitudinal relationship between students' sense of belonging in the HE learning environment and their becoming of a professional in their chosen discipline (i.e., their professional identity), and the role of peer relationships in students' sense of belonging and professional identity development. Therefore, we collected longitudinal data among students within a course programme that is embedded in a problem-based learning (PBL) curriculum (Wijnia et al., 2011). To study the relationships between sense of belonging and professional identity, we analysed longitudinal data with cross-lagged panel models (CLPMs), which allow to study how sense of belonging and professional identity are related to each other over time. To study selection and influence in peer networks, we analysed complete longitudinal social network data by using stochastic actor-oriented models (SAOMs; Snijders, 2011). SAOMs allow to distinguish simultaneous dynamics of network formation and their relationship to student characteristics. By doing so, we go beyond van Lamoen et al. (2025) who made use of a subset of the same data to merely investigate social selection of peer relationships.

Method

Sample and procedure

We obtained data during the academic year 2022-2023 from 247 first-year students who were enrolled in a psychology bachelor programme of a research university in the Netherlands. The mean age of the participants was 19.96 years old ($SD = 2.52$) and 81% was female ($n = 200$). Around 35% of students were first-generation in HE students and 30% had a migrant background. The course programme was offered in a small-group learning environment based on the principles of problem-based learning (Wijnia et al., 2011). Students met twice a week in small tutorial groups together with 12-20 students and a tutor who guided the group and facilitated group discussions. During the sessions, students collaboratively apply knowledge and skills to develop a solution for a problem related to psychology.

Participants filled out three online surveys during the first semester, in September (t1), November (t2), and January (t3). The surveys included questions to collect individual-level

data (i.e., sense of belonging, professional identity) and relational-level data (i.e., nominations of friendship and help-seeking relations). The study's aims and procedures, including voluntary participation, anonymous data storage and ethical guidelines, were explained before students gave informed consent and filled out the survey. Ethical approval for the current study was granted by the university's ethical committee (reference number 2223-0646).

Measures

Self-report measures

Sense of belonging was measured with a 6-item scale that was developed by Meeuwisse et al. (2010). An example item is 'I feel at home at my educational programme.' Answer categories ranged from 1 ('Not true at all') to 5 ('Completely true'). Cronbach's alpha's indicated sufficient reliability ($\alpha_{t1} = .71$; $\alpha_{t2} = .78$; $\alpha_{t3} = .77$).

Professional identity was measured with an 8-item scale that was originally developed by Bennett (2010) and adapted to the HE undergraduate context by Tomlinson and Jackson (2021). An example item is 'I feel I share characteristics with other psychologists.' Answer categories ranged from 1 ('Not true at all') to 5 ('Completely true'). Cronbach's alphas indicated good reliability ($\alpha_{t1} = .79$; $\alpha_{t2} = .82$; $\alpha_{t3} = .87$).

Sociometric measures

Peer networks were measured by nomination questions which followed the following procedure: Students filled out their student number after which a list of peers in their tutorial group was presented. They further could nominate ten additional peers from the psychology programme in response to a question about regular contact (e.g., activities, conversations) in the past three weeks, excluding tutorial group members. Students were supported with this free recall method as names of peers popped up automatically when they typed a part of the name of their peer.

For the *friendship network*, students were asked to nominate peers from their course programme who they consider friends. Friendship relations were measured as a dichotomous variable (0 = 'not a friend'; 1 = 'friend'). For the *help-seeking network*, students were asked to nominate peers they go to for academic related advice and support. Help-seeking was also measured as a dichotomous variable (0 = 'no help-seeking relation'; 1 = 'help-seeking relation'). Both the friendship and help-seeking networks were represented in directed adjacency matrices for each wave. Cells coded as 1 indicated a friendship or help-seeking nomination from student i to j , and cells coded 0 indicated absence of a nomination.

Control variables

To account for proximity effects (i.e., physically close individuals are more likely to connect), we included shared tutorial membership in the network models as a covariate. Furthermore, we controlled in these network models for students' gender and academic performance as these are well-known drivers of peer network development in HE (Lomi et al., 2011; Stadtfeld et al., 2019). Gender was coded 0 = male, 1 = female. Academic performance was measured by students' grades across their first year in HE.

Analytical strategy

Cross-lagged panel models

Cross-lagged panel models (CLPMs) were used to investigate the relationship between sense of belonging and professional identity across the three waves (*RQ1*). CLPMs included autoregressive paths, within-time correlations between sense of belonging and professional identity, and regression paths between these variables across timepoints (e.g., from belonging at t_1 to professional identity at t_2). Model fit was assessed by recommended fit indices (Kline, 2011): χ^2 ($p < .05$), Comparative Fit Index (CFI) > 0.90 and root-mean-square error of approximation (RMSEA) < 0.08 . The firstly fitted traditional CLPM (see Appendix B) reached poor model fit, $\chi^2(4) = 36.433, p = 0.000$; CFI = 0.945; RMSEA = 0.184. Therefore, we included random intercepts, following suggestions of Hamaker et al. (2015). Random intercept CLPMs (RI-CLPMs) account for stable individual differences by separating between-person (time-invariant) and within-person (time-varying) effects. Random intercepts represent the stable between-person differences in sense of belonging and professional identity and within-person autoregressive effects capture the within-person stability of these two factors. Further, and most interesting to *RQ1*, cross-lagged effects test the within-person relations between sense of belonging and professional identity.

Stochastic actor-oriented models

To address *RQ2* and *RQ3* about peer networks and individual students' sense of belonging and professional identity, we used a series of stochastic actor-oriented models (SAOMs; Ripley et al., 2024; Snijders et al., 2010). These models are appropriate to model interdependencies in social networks and individuals' attributes, such as sense of belonging and professional identity, over time. In SAOMs, co-evolution of networks and individual attributes are modelled by a simulation-based method. Within these simulations, change in network patterns and individual attributes occurs in a series of mini-steps in which members of the population (i.e., students) are randomly selected and permitted to make a single decision to adjust

their network ties or individual attributes in a way that optimally matches their preferences. This means that, at each iteration in the simulation, students maintain, select or deselect a friendship or help-seeking tie (*peer selection*) and/or may change their sense of belonging or professional identity (*peer influence*). Each of our models thus have two outcome variables: the peer network and the individual attribute. In this study, we fit four models that each capture the co-evolution of one peer network (friendship or help-seeking) and one individual attribute (sense of belonging or professional identity).

A graphical representation of the included effects is presented in Appendix C. In the network dynamics part (*peer selection*) of the models, we firstly included several common structural network effects that are frequently found to be important in peer networks in (higher) educational settings and that should be accounted for (Brouwer et al., 2022; van Lamoen et al., 2025; Veenstra et al., 2013). *Outdegree* describes the general tendency for students to have outgoing ties. *Reciprocity* describes the tendency for actors to reciprocate a relationship. *Transitivity* captures the tendency to form groups in which all members are connected and *Transitive reciprocated triplets* captures the tendency to reciprocate relationships within transitive groups. Further, three degree-related effects that we included were: *indegree-popularity*, the tendency to send more nominations when receiving more nominations, *outdegree-activity*, the tendency to nominate more over time if already nominating more previously, and *indegree-activity*, the tendency to connect more to others if receiving more incoming connections. Lastly, we included an *out-isolate* effect, which captures the tendency to send no friendship or help-seeking relations. We included this last effect as our goodness-of-fit indices indicated that our models did not sufficiently capture students' tendency to have no relationships within the course programme (see Appendix D).

In addition, we included selection effects with respect to sense of belonging, professional identity, and the control variables (gender, grades, tutorial group membership). We included *ego/alter* effects that reflect how student attributes affect the tendency to nominate more/less peers as friend/helper (ego) and how these attributes affect the tendency be nominated by others (alter). We also included same/similarity effects which capture the tendency for students to relate with students with same (for gender, group) or similar (for grades, sense of belonging, professional identity) attributes.

In the peer influence part of the model, network ties are used as the predictor variable with sense of belonging and professional identity as outcome variables. The *behavioural tendency* (linear and quadratic shape effects) parameters model the overall tendency towards high or low values on belonging and professional identity. The *indegree* and *outdegree* effects represent effects of the number of incoming and outgoing relationships on sense of belonging and professional identity. The *average similarity* effect represents tendencies for students to adjust their belonging or professional identity to the mean of their friendship/help-seeking relations, regardless of the number of relations. This effect captures both increases in belonging and professional identity in response to friends with higher levels on these variables, as well as

decreases in belonging and professional identity in response to friends with lower levels of belonging than the student. Lastly, we accounted for the effects of individuals' gender and grade performance on belonging and professional identity for more robust estimates of network influence.

Results

Descriptive and network statistics

Table 1 presents descriptive statistics including means, standard deviations, and bivariate correlations between individual-level key variables (sense of belonging, professional identity, course grades, gender). Sense of belonging and professional identity were positively correlated across all three waves ($.41 \leq r \leq .43$) as well as between waves ($.29 \leq r \leq .43$). Sense of belonging and professional identity were not related with grades and gender at all waves. Network statistics are presented in Table 2. Density refers to the proportion of possible relationships that were actual relationships and was calculated by dividing the number of actual friendship and help-seeking ties by all possible ties (Wasserman & Faust, 1994). Density of the friendship network increased from 0.92% at T1 to 1.05% at T3. Density of the help-seeking network decreased from 1.89% to 0.84%. Reciprocity percentages indicate that the proportion of reciprocated relationships increased over time, both in the friendship network, with 43.41% of relationships at T1 and 52.90% at T2, and in the help-seeking network, with 43.64% at T1 and 49% at T2. Degree statistics further indicate that students on average had approximately two friends. Average degree in the help-seeking network decreased from 4.06 at T1 to 2.45 at T2 and remained relatively stable between T2 and T3. The decrease in help-seeking relations between T1 and T2 is also reflected in the large number of dissolved relationships ($n = 637$) between these timepoints. The Jaccard similarity indices, a measure of network stability over time, had values of around .30 or higher, which is the recommended cut-off value to conclude that networks were sufficiently stable across waves to expect a good model fit in the SAOMs (Ripley et al., 2024; Snijders et al., 2010). Moran's I network autocorrelation coefficients were calculated as an indication of the degree of spatial autocorrelation of sense of belonging and professional identity among individuals who were connected (Steglich et al., 2010). These values range from -1 to +1. A value of 0 indicates tie similarity as expected under random pairing. Negative/positive values mean that social ties are less/more similar than expected under random pairing. Moran's I values are increasing somewhat over time in the friendship and help-seeking network (see Table 2), which implies that students become more associated with each other in terms of their belongingness and professional identity level.

Table 1 Descriptive statistics and intercorrelations between key variables

	M	SD	1	2	3	4	5	6	7	8
1 T1 Sense of belonging	4.19	0.53	(-)	0.62***	0.62***	0.41***	0.41***	0.29***	-0.02	-0.02
2 T2 Sense of belonging	4.07	0.50		(-)	0.73***	0.32***	0.43***	0.42***	0.13	0.04
3 T3 Sense of belonging	3.96	0.60			(-)	0.29***	0.43***	0.43***	0.04	0.05
4 T1 Professional identity	3.94	0.50				(-)	0.68***	0.62***	-0.07	-0.06
5 T2 Professional identity	3.91	0.51					(-)	0.67***	-0.10	-0.03
6 T3 Professional identity	3.86	0.60						(-)	-0.08	0.12
7 Grade performance	7.12	0.88							(-)	-0.11
8 Gender	0.81	0.39								(-)

Note. Grade performance is measured by grade point average with minimum value of 0 and maximum values of 10. Gender is coded 0 = male and 1 = female.

*** $p < .001$; ** $p < .01$; * $p < .05$.

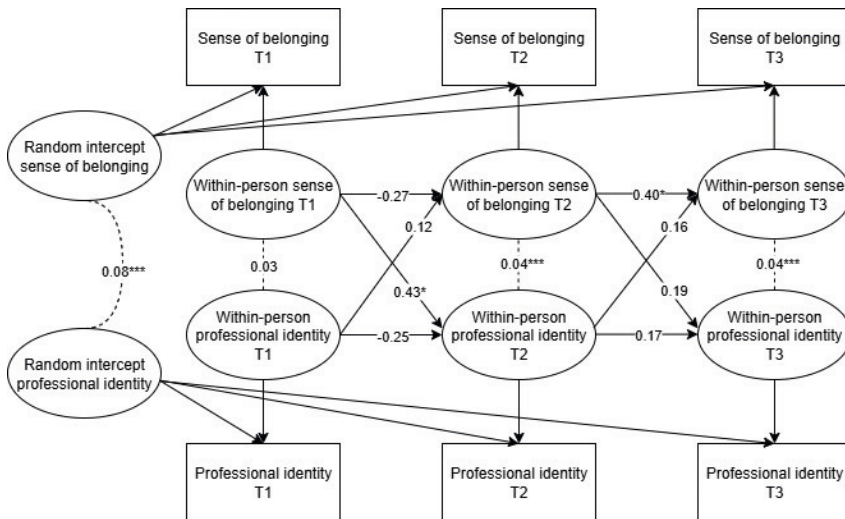
Table 2. Descriptive network statistics

	Friendship networks			Help-seeking networks		
	T1	T2	T3	T1	T2	T3
Network statistics						
Density (%)	0.92	1.00	1.05	1.89	1.00	0.84
Reciprocity (%)	43.41	47.78	52.90	43.64	45.10	49.00
M degree	1.98	2.01	1.84	4.06	2.45	2.29
SD Indegree	1.56	1.81	1.54	2.46	1.95	1.90
SD Outdegree	2.32	2.33	1.92	3.82	2.33	2.08
Change in relationships						
Jaccard index (stability)	.381	.461		.294	.441	
No. of relationships dissolved ($1 > 0$)		216	197		637	246
No. of relationships emerged ($0 > 1$)		225	154		239	208
No. of relationships maintained ($1 > 1$)		272	300		365	358
Moran's I (network autocorrelation)						
Sense of belonging	.05	.12	.11	.05	.09	.15
Professional identity	.01	-.03	.11	-.05	.06	.10

Association between sense of belonging and professional identity

The final RI-CLPM that was used to investigate the longitudinal relation between senses of belonging and professional identity (*RQ1*) is depicted in Figure 1. Fit indices of this model were $\chi^2(2) = 0.361$, $p = 0.361$; CFI = 1.000; RMSEA = 0.009, indicating good model fit. At the between-person level, Figure 1 indicates that the random-intercepts of sense of belonging and professional identity were correlated with each other. This means that students who generally felt a stronger sense of belonging also tended to have a stronger professional identity, and this relationship is consistent across individuals in the sample. At the within-person level, cross-lagged paths in Figure 1 indicate that prior sense of belonging at T1 positively predicted professional identity at T2; however, prior professional identity at T1 did not predict sense of belonging at T2. No significant cross-lagged paths were indicated from T2 to T3. Further, the significant auto-regressive effect from sense of belonging at T2 to sense of belonging at T3 indicates that within-person changes in sense of belonging at T2 preceded within-person changes in belongingness at T3. No other significant auto-regressive effects were observed.

Figure 1 Random-intercept cross-lagged panel model of sense of belonging and professional identity.



Note. Random intercept cross-lagged panel model showing relations between sense of belonging and professional identity across three waves. RI_SB, random intercept sense of belonging; RI_PI, random intercept professional identity.

*** $p < .001$; ** $p < .01$; * $p < .05$.

Co-evolution models of friendship and help-seeking networks

Results of the friendship and help-seeking co-evolution models are presented in Table 3 (sense of belonging) and Table 4 (professional identity), including the estimates and standard errors for each effect. The estimates can be interpreted as log odds for a friendship or help-seeking relationship to exist (selection part of the model) or for sense of belonging/professional identity to increase (influence part of the model). Below, we firstly report on the effects that are of interest to our research questions (i.e., co-evolution of peer networks with sense of belonging and professional identity), after which we discuss the structural network effects and effects of the control variables.

Table 3 Co-evolution models of peer networks and sense of belonging

Parameters	Friendship			Help-seeking		
	Est.	(SE)		Est.	(SE)	
Network dynamics (peer selection)						
Structural network effects						
Outdegree (density)	-3.53	(0.28)	***	-3.23	(0.22)	***
Reciprocity	4.09	(0.31)	***	3.62	(0.26)	***
Transitive triplets	1.28	(0.12)	***	0.78	(0.09)	***
Transitive recip. triplets	-0.94	(0.18)	***	-0.52	(0.16)	**
Indegree-popularity	-0.04	(0.05)		0.06	(0.03)	*
Outdegree-activity	0.08	(0.03)	**	0.03	(0.02)	
Indegree-activity	-0.58	(0.17)	***	-0.48	(0.08)	***
Out-isolate	1.46	(0.44)	***	1.19	(0.37)	**
Cross-network effects						
Help-seeking	1.93	(0.21)	***			
Friendships				2.31	(0.20)	***
Attribute effects						
Gender (F) alter	-0.05	(0.19)		-0.18	(0.16)	
Gender (F) ego	-0.37	(0.17)	*	0.37	(0.16)	*
Same gender	0.35	(0.16)	*	0.21	(0.15)	
Same group	0.03	(0.16)		0.07	(0.11)	
Grade alter	0.01	(0.06)		0.13	(0.05)	**
Grade ego	0.02	(0.07)		0.03	(0.07)	
Grade ego * grade alter	0.15	(0.07)	*	0.09	(0.05)	
Belonging alter	0.05	(0.13)		0.09	(0.10)	
Belonging ego	0.28	(0.14)	*	0.36	(0.13)	**
Belonging ego * belonging alter	0.27	(0.22)		0.19	(0.19)	
Predictors of sense of belonging (peer influence)						
Linear shape	-0.47	(0.15)	**	-1.46	(0.20)	*
Quadratic shape	-0.13	(0.05)	**	0.10	(0.07)	

Table 3 *Co-evolution models of peer networks and sense of belonging (continued)*

Parameters	Friendship		Help-seeking		
	Est.	(SE)	Est.	(SE)	
Average similarity reciprocated alters	3.32	(1.26)	**		
Average similarity			3.40	(1.90)	
Indegree	0.13	(0.08)	0.14	(0.07)	*
Outdegree	-0.04	(0.06)	-0.10	(0.05)	*
Gender (F)	0.23	(0.22)	0.24	(0.21)	
Grade performance	0.10	(0.08)	0.06	(0.09)	

Note. Ego = sender, student who initiate relationships; alter = receiver, fellow student selected by others. Convergence t-ratio's all <0.09; overall maximum convergence ratio all <0.25.

*** $p < .001$; ** $p < .01$; * $p < .05$.

Co-evolution of networks and sense of belonging

Table 3 shows that students with a higher sense of belonging were more active with befriending their peers and asking them for help (positive belonging ego effects). No selection effects were found of belonging alter and belonging ego*belonging alter, implying that students with a higher sense of belonging were not more popular to befriend or ask for help (i.e., alter effect) and that students did not build relationships with peers based on similarity in sense of belonging (i.e., ego*alter effect). The influence effects further show that students tended to adopt a sense of belonging similar to that of their reciprocated friends: students were thus influenced by the level of belongingness of their friendship relations. Furthermore, the positive indegree effect in the help-seeking networks implies that students who were more often asked for help developed a stronger sense of belonging over time. However, asking for help led to a lower sense of belonging over time (negative outdegree effect).

Co-evolution of networks and professional identity

Table 4 indicates that professional identity played a smaller role in the peer networks as compared to sense of belonging. In the friendship network, no selection or influence effects were found. This means that students did not select their friends based on their own level of professional identity and that students' level of professional identity was not influenced by their friends' professional identity level. Within the help-seeking network, the positive professional identity ego*professional identity alter effect indicates that students tended to ask help from peers with a similar level of professional identity. No influence effects were found of the peer networks on professional identity, implying that students' professional identity did not change in response to their relationships with peers.

Table 4. Co-evolution models of peer networks and professional identity

Parameters	Friendship			Help-seeking		
	Est.	(SE)		Est.	(SE)	
Network dynamics (peer selection)						
Structural network effects						
Outdegree (density)	-3.54	(0.26)	***	-3.29	(0.24)	***
Reciprocity	4.04	(0.51)	***	3.60	(0.27)	***
Transitive triplets	1.24	(0.12)	***	0.77	(0.09)	***
Transitive recip. triplets	-0.90	(0.18)	***	-0.52	(0.15)	***
Indegree-popularity	-0.03	(0.04)		0.06	(0.02)	**
Outdegree-activity	0.08	(0.03)	*	0.03	(0.02)	*
Indegree-activity	-0.55	(0.21)	*	-0.45	(0.09)	***
Out-isolate	1.49	(0.41)	***	1.23	(0.39)	**
Cross-network effects						
Help-seeking	1.95	(0.21)	***			
Friendships				2.29	(0.17)	***
Attribute effects						
Gender (F) alter	-0.05	(0.16)		0.16	(0.16)	
Gender (F) ego	-0.36	(0.16)	*	0.38	(0.17)	*
Same gender	0.32	(0.15)	*	0.17	(0.14)	
Same group	0.04	(0.15)		0.08	(0.12)	
Grade alter	0.01	(0.06)		0.13	(0.05)	
Grade ego	0.02	(0.07)		0.03	(0.06)	*
Grade ego * grade alter	0.15	(0.07)	*	0.10	(0.06)	
Prof. id. alter	-0.05	(0.12)		-0.05	(0.10)	
Prof. id. ego	0.02	(0.12)		0.14	(0.10)	
Prof. id. ego * Prof. id. alter	0.15	(0.17)		0.30	(0.15)	*
Predictors of professional identity (peer influence)						
Linear shape	-0.11	(0.12)		-0.18	(0.14)	
Quadratic shape	-0.13	(0.05)	**	-0.13	(0.07)	
Average similarity reciprocated alters	1.89	(1.19)				
Average similarity				1.43	(1.52)	
Indegree	0.01	(0.06)		0.05	(0.05)	
Outdegree	0.01	(0.05)		-0.01	(0.04)	
Gender (F)	0.24	(0.18)		0.21	(0.16)	
Grade performance	-0.08	(0.07)		-0.09	(0.07)	

Note. Ego = sender, student who initiate relationships; alter = receiver, fellow student selected by others. Convergence t-ratio's all <0.09; overall maximum convergence ratio all <0.25.

*** $p < .001$; ** $p < .01$; * $p < .05$.

Structural network effects and control variables

Structural network effects indicate similar patterns of friendship and help-seeking preferences across sense of belonging and professional identity models. The negative outdegree effects imply that students were selective in creating ties and only did so if they perceived ties as attractive. Positive reciprocity effects imply that students tended to reciprocate relationships, and positive transitive triplets mean that students clustered in groups. The negative transitive reciprocated triplet effects express that reciprocity of relationships was less strong within groups than between groups. Positive outdegree-activity effects mean that it was likely that students formed new ties if they already had a relatively large number of ties. Negative indegree-activity effects express that students who were nominated more often as friends or helpers tended to build fewer new ties compared to others. Lastly, the positive out-isolate effects mean that isolate students had the tendency to not send any friendship or help-seeking ties (i.e., remain an isolate in the networks).

Cross-network effects indicate a tendency of friends to become helpers (positive friendship effect) and vice versa (positive help-seeking effect). Women initiated less friendships than men (negative gender-ego effect) but were more likely to approach others for help (positive gender-ego effect). Students preferred friendships with same-gender peers (positive same gender effect) and similar course grades (positive grade ego*grade alter effect). Higher achieving students were more often approached for help (positive grade alter effect). Gender and grade performance did not influence sense of belonging and professional identity.

Discussion

Small-group, student-centred, and problem-driven learning environments can support first-year students' sense of belonging and their becoming of a professional by providing a context that encourages supportive relationships with peers. The current study provides insights into the dynamic and mutual process of developing sense of belonging, professional identity, and peer networks at the transition to HE by asking three research questions: (1) To what extent do students' sense of belonging in HE and professional identity mutually contribute to each other's development at the transition to HE? (2) What is the role of sense of belonging and professional identity in students' selection process of friends and help-seeking? (3) To what extent are socially connected students in a course programme influenced by each other's sense of belonging and professional identity? Findings firstly reveal that sense of belonging and professional identity are closely interrelated and that sense of belonging contributes to professional identity development. Secondly, both sense of belonging and professional identity play a role in the formation of peer networks (i.e., social selection). Thirdly, sense of belonging is influenced by friendship and help-seeking peer networks, (i.e., social influence), but these networks do not influence professional identity.

Our findings on the association between sense of belonging and professional identity align with prior research in STEM and medical education that suggest a close link between these two concepts (Chen et al., 2021; Davis et al., 2023; Sternszus et al., 2024). We add to these studies by showing that a sense of belonging early during the transition to HE is predictive of professional identity development at a later stage. Thereby, we support theoretical expectations grounded in sociocultural perspectives on professional identity which emphasise that this identity is promoted when individuals experience personal fit in relevant contexts and feel treated as valuable members of communities related to their profession (Davis et al., 2023; Holland et al., 1998; Sternszus et al., 2024). Furthermore, our finding that the effect of sense of belonging on professional identity specifically occurs during students' first few months in HE corroborates prior research on the transition to HE which specifically emphasises this stage – the so-called 'encounter stage' – as a formative period, or as a stage of 'becoming,' in students' academic trajectories (Coertjens et al., 2017; Gale & Parker, 2014; Lairio et al., 2013).

Findings on the co-evolution of peer networks with sense of belonging and professional identity provide important new insights. Previous research mainly suggests that social connections (e.g., friends or peers to go to for support) enhance sense of belonging (Allen et al., 2021; Anistranski & Brown, 2023; Gilani & Thomas, 2025; Hausmann et al., 2009) and professional identity development (Jensen & Jetten, 2015; Tomlinson & Jackson, 2021). Our results however show different and more complex co-evolution mechanisms. Firstly, sense of belonging and professional identity appear to play a role in the development of friendship and help-seeking networks. Most notable is that sense of belonging enhances students' activity in the networks, implying that a higher sense of belonging leads to a higher tendency to approach peers to build new friendship or help-seeking ties. This is in line with our earlier study on the development of peer networks (van Lamoen et al., 2025) and supportive of theoretical expectations of sense of belonging as a driver of (social) behaviours within educational contexts (Strayhorn, 2018; Walton et al., 2012; Won et al., 2021). For professional identity, our study shows that students tend to ask help from peers with similar levels of professional identity. Comparable to other types of social identity (Mehrpour et al., 2025), this result hints at a homophily preference of students to relate with peers who share an identity as such relationships are generally more rewarding and easier to maintain.

Regarding social influence, we find effects of friendship and help-seeking ties on sense of belonging, although mechanisms vary between the two types of networks. Whereas previous research showed that the number and quality (e.g., closeness) of friendships have a positive effect on sense of belonging (Anistranski & Brown, 2023; Gilani & Thomas, 2025), we show that friends influence each other's sense of belonging and become more similar over time. Friends influencing each other's sense of belonging speak to the idea grounded in Bandura's (1986, 2001) social cognitive theory that attitudes and beliefs are influenced by social interactions and observations of others. Students may share their positive or negative thoughts about and experiences with HE with their friends and such expressions then shape their friends' sense of belonging. While Rambaran et al. (2022) indicated similar socialisation processes in

secondary education, our study is the first to show these in HE. Most importantly, this finding implies that merely having friends does not necessarily lead to increased sense of belonging, but that it matters who become friends.

In the help-seeking network, our finding that being asked for help increases sense of belonging is in line with prior research and supports the idea that being approached for help functions as a signal for students that they are recognised as valuable and knowledgeable members of the HE community (Jensen & Jetten, 2018). Conversely, our results show a negative effect of asking for help on sense of belonging, which is a more puzzling finding. One possible explanation mirrors the explanation of the positive effect of being approached for help. Often asking for help might signal a lack of competence and ability to students, which can negatively affect how they perceive their place within the academic community, particularly as independence is a highly valued norm on HE campuses (Stephens et al., 2012). Yet, more research is needed to explain this unexpected finding.

Peer relationships in the academic context, where students work together on assignments related to their future profession, were also expected to influence professional identity (Davis et al., 2023; Jensen & Jetten, 2015; Tan et al., 2016), but our results do not show such effects. One explanation for this finding might be that students' professional identity was relatively stable during their transition into the psychology course programme. Prior studies indicated the transition to HE as a formative moment in students' professional identity (Reid et al., 2008), which could for instance lead to a 'reality shock' when students encounter the actual characteristics of their chosen professional field, leading to a decrease in professional identity (Burlison et al., 2021). For this to happen, it is however necessary that students perceive congruence between the curriculum and their intended future profession, which is particularly hard in 'broad' HE course programmes that could lead to numerous related professions, including psychology (Reid et al., 2008). For many HE students in programmes such as psychology, the first year in HE might be too early for professional identity development, as students are adjusting to the academic environment and are mostly occupied with firstly exploring their course programme.

Implications

The results from our study have various implications for practice and research aimed to enhance first year student success at the transition to HE. Increasingly, institutions aim to support students by implementing small-group, student-centred, and problem-driven learning environments. While research shows that such environments might indeed succeed in creating a proximal environment in which students can succeed (Brouwer et al., 2019; Severiens et al., 2015; Wijnia et al., 2011, 2024), our study shows that students' sense of belonging affects the extent to which they access supportive resources, including emotionally and academically supportive relationships, and the acquisition of a professional identity. How students perceive

their place within the HE learning environment – whether they belong – already seems to have an impact early during students' academic trajectory in HE. Enhancing students' sense of belonging in HE, for instance by providing belonging-specific interventions early at the transition to HE (van Lamoen et al., 2024; Walton et al., 2012), might for instance be a way in which HE institutions can support students with peer relationship development and, consequently, academic achievement and well-being in HE.

Limitations and future directions

The findings should be considered by taking some limitations of the study into account. First, the study was conducted among students enrolled in one psychology course programme, limiting generalisability to other contexts. This might be particularly the case for results on professional identity, as the 'content' of this identity varies between HE disciplines, depending on the extent to which they are professionally oriented (Reid et al., 2008). Second, the network boundary was limited to the peer network in the course programme, in order to study selection and influence processes (Steglich et al., 2010). Similarly, students' sense of belonging was solely measured on course programme level. Previous research indicates that students have important supportive relationships outside of the course programme, including for instance students enrolled in different programmes or peers outside of the HE institution (Mishra, 2020). Recent works on sense of belonging further show that it is important to disentangle various domains of sense of belonging, including for instance students' belongingness to the HE institute instead of solely the course programme (Ahn & Davis, 2020). To get a more complete picture of the connection between different types of peer relationships and different domains of belonging, future studies could combine ego network data with complete network data.

Conclusion

The findings show that sense of belonging plays a role in the development of professional identity and the formation of peer networks among first-year students in HE. While sense of belonging plays a role in both the selection and influence processes within peer networks, professional identity appears to be more stable and less affected by peer relationships during the initial transition to HE. This suggests that interventions aimed at enhancing students' sense of belonging early in their academic journey could be beneficial for fostering supportive peer networks and promoting professional identity development. Future research should continue to explore these dynamics across different disciplines and educational contexts to better understand the interplay between social relationships, sense of belonging, and professional identity in HE.



Chapter 7

Summary and discussion

Student populations in higher education (HE) have increased both in terms of size and diversity over recent decades (Marginson, 2016; OECD, 2024). Although latest enrolment prognoses in the Netherlands and similar countries indicate stabilisation or even decline of student numbers in HE institutions, the trend towards diversification is expected to continue, for instance because more students with a migration background become eligible to enrol in HE (OECD, 2024; Statistics Netherlands, 2024b). Research however shows that minority groups of students, including those who are first-generation in HE (FGHE; i.e., students with parents who did not study in HE) and/or have a migration background, have fewer opportunities for success in HE compared to majority students (Gopalan & Brady, 2020; López et al., 2023; OECD, 2024; Spiegler & Bednarek, 2013). Many HE institutions have therefore set the aim to improve accessibility and inclusivity of their learning environments (European Commission, 2023). Prior research has identified the transition to HE as a period that could set the stage for accessible and inclusive learning environments (Coertjens et al., 2017; Leese, 2010), but it remains unclear which factors contribute to opportunity gaps at the transition to HE and how effective support should be organised for diverse first year student populations to succeed in HE (Netherlands Initiative for Education Research (NRO), 2024). Therefore, this dissertation has the two main objectives to 1) identify factors that contribute to opportunity gaps between minority and majority groups of students at different stages of the transition to HE, and 2) study how diverse groups of students can be supported in the transition to HE.

In this final chapter, I firstly summarise and discuss the main findings of the five empirical subprojects conducted at various subsequent stages of the transition to HE. These subprojects each contribute to the main objectives of this dissertation by addressing important factors related to equity and student support during the transition to HE. Then, I will discuss how these findings contribute to the dissertation's two main objectives, meaning that I discuss how the results provide new insights into factors that contribute to opportunity gaps and into ways to support HE students coming from diverse backgrounds. Subsequently, I discuss several strengths and weaknesses of the studies, provide suggestions for future research, and present some implications for educational practice. The chapter ends with a final conclusion of the main messages of this dissertation.

Summary of main findings

Score differences and differential prediction of selective admissions instruments

Choosing and then enrolling into HE course programmes is one of the major tasks for students at the preparation stage of the transition to HE. Across countries, ethnic minority students have lower chances of admission into HE course programmes if selection is based on students' prior academic achievement (Bradburn & Schmitt, 2019; Rosinger et al., 2021). Similarly, studies conducted in the Netherlands have repeatedly shown that students with a non-Western migration background⁸ have lower chances of admission into HE course programmes if grades are used in admissions procedures (Dutch Inspectorate of Education, 2023; Fikrat-Wevers et al., 2023; Stegers-Jager, 2018). Non-grade admissions instruments may show smaller or no differences between students with different migration backgrounds. In **Chapter 2**, we examined two of such instruments, being a curriculum-sample test (CST) and assessments of motivation, as well as a composite score consisting of pre-university grade point average (pu-GPA), the CST, and the assessments of motivation. For the CST, participants studied domain-specific (i.e., psychology) materials and took an exam. The assessments of motivation consisted of open and close-ended questions on students' motivation to study psychology. Specifically, we aimed in Chapter 2 to investigate score differences of these admissions instruments related to students' migration background and whether the instruments are predictive of students' grade point average (GPA) in HE, both for students with no migration background and with a non-Western migration background (i.e., differential prediction). We studied these instruments by using real-world high-stakes data from 306 students obtained from an admissions procedure of an undergraduate psychology programme.

Results from t-tests, controlled for range restriction (Sackett & Yang, 2000), showed that students with a non-Western migration background had lower pu-GPAs compared to students without a migration background. No significant score differences were found on the CST, the assessments of motivation, and the composite score. Regarding predictive validity, Pearson correlation analysis indicated that pu-GPA, the CST and the composite score were predictive of course grades, with pu-GPA as the strongest predictor. Assessments of motivation did not predict course grades. Hierarchical step-down regression analyses further indicated differential prediction depending on students' migration background. That is, pu-GPA, the

8 In Chapter 2 and the published manuscript based on Chapter 2 we refer to students with a non-Western migration background as ethnic minority students to increase relevance of our findings for an international academic audience. In Chapter 4 and 5, we choose to adopt terminology that was as close as possible to the available data, implying that we referred to students as having no migration background, a Western migration background, or a non-Western migration background.

CST, and the composite score showed overprediction of first-year GPA for students with a migration background (i.e., their GPA in HE was lower than expected based on their admissions test scores). Lastly, the assessments of applicants' motivation to study psychology appeared to be predictive of the course grades of students without a migration background, but not of the grades of students with a non-Western migration background.

In sum, Chapter 2 replicates prior studies by showing that pu-GPA is predictive of course grades in HE but reduces admission probabilities of students with a non-Western migration background (Fikrat-Wevers et al., 2023; Rosinger et al., 2021; Stegers-Jager, 2018) and that assessments of motivation have poor predictive validity of first-year GPA but do increase admission probabilities of non-Western migration background students (Niessen & Meijer, 2017; Schmitt et al., 2009; Woo et al., 2023). These results thus point at a classic trade-off between validity and diversity as aims of admissions policies (Pyburn et al., 2008). Our findings on the CST show promise in both lowering score differences related to migration background while maintaining predictive validity. Results on the CST's general predictive validity align with previous studies on similar admissions instruments (Niessen et al., 2016, 2019; Reibnegger et al., 2010). Our findings regarding absent score differences by migration background add to recent work by Fikrat-Wevers et al. (2023), who reported mixed results - some CSTs showed no score differences, while others did, with non-Western students scoring lower. Our results suggest some potential of the CST as a more equitable and valid tool for student admissions in HE, but require replication in different course programmes, with larger samples, and, particularly, with samples including both admitted and non-admitted students.

The effects of a pre-academic programme on students' transition to HE

In **Chapter 3**, we aimed to study the effectiveness of a pre-academic programme (PAP) to support first year students at the encounter stage of the transition to HE. We did so by researching the impact of the PAP on sense of belonging, academic self-efficacy, and academic achievement. Sense of belonging refers to students' feeling of connectedness with the HE community, that one is accepted, and that one fits in (Dias-Broens et al., 2024; Hausmann et al., 2009). Academic self-efficacy refers to students' perception of their ability to learn and perform in the educational context (Bandura, 1997). Academic achievement was operationalised as the average of students' course grades during their first semester in HE.

Prior research indicates heightened and background-specific challenges among FGHE students at the encounter stage of transition to HE, such as feeling less knowledgeable about studying and less secure about belonging in HE than their continuing-generation in HE (CGHE) peers (Leese, 2010; López et al., 2023; Spiegler & Bednarek, 2013). The PAP therefore adopted intervention strategies that were specifically tailored to address these challenges. Informed by literature on difference-interventions, the programme explicitly acknowledged and taught

how participants' identities can influence experiences in HE (Denson, 2009; Stephens et al., 2014). Informed by research on social capital interventions (Parnes et al., 2020; Schwartz et al., 2018), the PAP further aimed to enhance participants' mobilisation of on-campus social capital. In our study, we examined whether these strategies were effective by investigating heterogeneous effects of programme participation between FGHE and CGHE students, and by investigating whether potential effects on sense of belonging, self-efficacy, and academic achievement were mediated by an effect of the PAP on the mobilisation of peer and faculty social capital. We examined the effect of the programme by using a quasi-experimental pre-test – post-test design. The PAP was organised online due to COVID-19 regulations.

Multilevel regression analysis with student administration data ($N_{\text{PAP}} = 463$; $N_{\text{Control}} = 948$) firstly showed that PAP participants received higher grades during their first semester in HE. Generation in HE-status did not affect academic achievement, and programme effects did not differ between FGHE and CGHE students. Multilevel analysis with survey data ($N_{\text{PAP}} = 115$; $N_{\text{Control}} = 544$) revealed that PAP participants had a higher sense of belonging after participation but did not have a higher academic self-efficacy post intervention. Similar to academic achievement, we did not find a main effect of generation in HE-status on sense of belonging and self-efficacy, nor did we find differential effects of programme participation between FGHE and CGHE students. Lastly, we used path analysis to test whether the effects of programme participation on academic achievement and sense of belonging were mediated by an effect on the mobilisation of peer and faculty social capital. This analysis revealed that PAP participants reported a higher occurrence and quality of formal (i.e., study related) and informal (i.e., not study related) interactions with their peers in the course programme, which in turn was positively related with sense of belonging in HE.

Findings in Chapter 3 strengthen evidence on the effectiveness of difference-education interventions (Stephens et al., 2014; Townsend et al., 2021) and social capital interventions (Parnes et al., 2020; Schwartz et al., 2018) by showing positive effects of the PAP on academic achievement, sense of belonging, and mobilisation of peer social capital. Furthermore, our study corroborates prior research on an earlier version of the PAP (van Herpen et al., 2020) which showed that participants attained higher grades and reported more formal and informal interactions with peers. Our study adds to this study by showing an effect on sense of belonging – which van Herpen et al. (2020) did not find – and showing similar programme effects for FGHE and CGHE students. Important, however, is to state that programme effects were generally small and that selection effects might have occurred. Replication studies, including research adopting randomised controlled trial designs, are warranted.

The emergence and development of diverse peer networks in a small group learning environment

At the encounter and adjustment stage of the transition to HE, students meet their study peers for the first time and gradually build new relationships that support student success (Brouwer et al., 2022; Coertjens et al., 2017; Mishra, 2020). Small group learning environments can support students with the development of supportive relationships by providing a proximal context where students can easily meet their peers. **Chapter 4** longitudinally examined whether and how student background characteristics (i.e., generation in HE-status and migration background) and sense of belonging play a role in the process of peer relationship development within a small-group learning environment. Specifically, we aimed to examine whether background characteristics and sense of belonging affect embeddedness in and segregation of friendship and help-seeking networks. Network embeddedness, defined as the number of social ties students have in the course programme, provides students with resources to succeed academically and feel well in the HE context (Buote et al., 2007; Mishra, 2020; Stadtfeld et al., 2019). Network segregation, defined as a network-level phenomenon whereby relations between similar peers are more likely than relations between dissimilar peers, hampers student learning from diversity and access to diverse sources of social capital (Bowman, 2010; Thijs & Verkuyten, 2014). We studied the process of peer network development by collecting survey and social network data at three waves among 247 first year students enrolled in a psychology course programme (i.e., complete social network data) and analysed this data with stochastic actor-oriented models (SAOMs; Snijders et al., 2010), which are particularly suited to study the role of student attributes (e.g., background characteristics, sense of belonging) in the formation of peer networks.

At the encounter stage of transition to HE, results showed that FGHE students befriended less peers and that students with a lower sense of belonging were less active with befriending peers and asking for help. Students also tended to befriend or ask help to peers who share a similar migration background (i.e., none, Western, non-Western). Sense of belonging in HE did not moderate the effects of generation in HE-status and migration background on the selection of peers. In other words, we did not find that the negative effect of FGHE-status on befriending peers was weaker for students with a stronger sense of belonging, nor did we find that students with a higher sense of belonging were more inclined to connect with peers with a dissimilar migration background. At the adjustment stage of the transition to HE, SAOMs indicated no effects of student background characteristics on the formation of peer networks. Sense of belonging however continued to play a role in the peer networks. Students preferred to ask help from students who experienced a similar sense of belonging or from students with a higher sense of belonging.

In sum, Chapter 4 shows that generation in HE-status and migration background play a role in peer network development at the encounter stage of transition to HE. FGHE students were less embedded than CGHE students in the friendship network at the start of the academic

year but became equally embedded at later stages. This finding mirrors previous research and suggests that FGHE students become more familiar over time with HE norms and culture which positively affects their activity in peer networks (Milem & Berger, 1997; Rubin, 2012). Homophily based on migration background is also a common result in educational studies, showing that friendships often occur between students who share (absence of) migration histories (Colak et al., 2019; Weber et al., 2020; Wimmer & Lewis, 2010). We add to these studies by showing that the tendency among students to form friendships based on shared migration backgrounds also extends to their help-seeking behaviours. Regarding sense of belonging, our study shows that students tended to ask help from peers with a strong or similar sense of belonging. This pattern of homophily based on belonging aligns with existing literature suggesting that a shared sense of belonging in classrooms fosters in-group identities, such as a shared student identity, which in turn encourages positive peer relationships (Gaertner et al., 1989; Holmes et al., 2019; Thijs & Verkuyten, 2014). However, contrary to expectations, a strong sense of belonging did not mitigate segregation based on migration background. Instead, it functioned as an independent factor contributing to peer network development by encouraging relationships between students who experience belongingness on similar levels. Lastly, students' sense of belonging at the encounter stage influenced their activity in approaching peers for friendships or help, thereby affecting students' access to valuable academic -related social capital embedded in the peer networks (Brouwer et al., 2016; Mishra, 2020). These findings provide important new insights into the consequences of sense of belonging for social relationship and social capital development within HE learning environments.

Sense of belonging, professional identity, and peer network development

Like Chapter 4, the empirical studies described in **Chapter 5** and **Chapter 6** are situated at the encounter and adjustment stage of the transition to HE. Together, the two studies aimed to examine the mutual longitudinal development of sense of belonging, professional identity, and peer networks within student-centred and small-group learning environments. Sense of belonging refers to students' subjective connection with the HE learning environment and its' communities (Dias-Broens et al., 2024; Hausmann et al., 2009; Kreutzmann et al., 2018). Professional identity refers to the subjective connection with their future professional work field and related academic discipline of the course programme wherein students are enrolled (e.g., law, psychology, medicine, engineering) (Tomlinson & Jackson, 2021; Trede et al., 2012). A strong professional identity promotes academic adjustment and retention by enhancing study motivation and engagement (Burlison et al., 2021; Jensen & Jetten, 2016) and is, at a later stage in students' educational and professional careers, emphasised as crucial for achieving career success at the education-to-work transition (Tomlinson & Jackson, 2021; Trede et al., 2012).

In **Chapter 5**, we studied students' sense of belonging and professional identity at the start of the academic year and at the end of the first semester in a two-wave study. Specifically, we examined whether sense of belonging predicts change in professional identity development, whether generation in HE-status and migration background affect students' sense of belonging and professional identity, and whether a professional identity is related to academic achievement (course grades) and commitment to the course programme during the transition to HE. To reach these aims, we collected survey and student administration data at two waves among first year students enrolled in law school ($N_{t1} = 198$; $N_{t2} = 124$; $N_{t1-t2} = 57$). The first survey was administered in September and the second in January. The law course programme was embedded in a problem-based learning curriculum (Wijnia et al., 2024).

Results showed positive correlations between sense of belonging and professional identity at two timepoints. Repeated measures ANOVA did however not indicate change in professional identity over time nor was there an effect of sense of belonging on change in professional identity between the two waves. At T1, students with a migration background did report a lower sense of belonging compared to students without a migration background. At T2, no differences were found in sense of belonging, but students with a migration background reported a stronger professional identity. No differences were found in sense of belonging or in professional identity between CGHE and FGHE students at either timepoints. Multivariate regression analysis showed no effect of professional identity on students' course grades. Models also included sense of belonging and minority status (i.e., FGHE-status and/or migration background), which showed a significant positive effect of sense of belonging and a significant negative effect of minority status on academic achievement. Lastly, multivariate regression analysis indicated a positive effect of professional identity on commitment to the law course programme, net of positive effects of sense of belonging and academic achievement on commitment. Students with a strong professional identity were thus more strongly committed to the law course programme. Results of this analysis further indicated a negative moderation effect of professional identity and academic achievement on course programme commitment. This negative moderation effect suggests that if students have a relatively strong professional identity, then course commitment is less dependent on course grades. And if students have relatively high grades, then course commitment is less dependent on professional identity.

Altogether, our study among first year law students shows that an emergent professional identity already supports students at the transition to HE by enhancing their commitment to their course of study. This finding supports previous research suggesting that an early professional identity helps students to connect their current educational endeavours with personal career goals, which in turn enhances commitment to their studies (Burluson et al., 2021; Jensen & Jetten, 2016). Specifically, we show that a well-developed professional identity helps students to stay committed to their studies if they achieve low course grades, and that a professional identity could thus function as a buffer against the negative effect of low achievement on commitment. This may particularly be the case for students with a migration background, who reported stronger professional identification with the law field. Results

however also contrast with previous research, as we found no effect of professional identity on academic achievement and observed no change in students' professional identity during the transition to HE (Burlison et al., 2021; Reid et al., 2008). A limitation of our study is however that data was collected at only two waves and that the sample of students participating in both waves was limited, both of which constrain the certainty to which conclusions can be drawn about the development of professional identity during the transition to HE.

Chapter 6 extended on Chapter 5 by employing an advanced longitudinal research design to study the mutual relationship between sense of belonging, professional identity, and networks of supportive peer relationships within the learning environment of a psychology course programme. We examined the longitudinal relationship between sense of belonging and professional identity by using random intercept cross-lagged panel models (RI-CLPMs; Hamaker et al., 2015). These models enable disentanglement of within-person and between-person differences, implying that lagged relations can only refer to fluctuations in sense of belonging or professional identity that occur within persons. This is important because we wanted to know how changes in individual students' sense of belonging and professional identity were related over time. In our investigation of the effect of peer relations, we aimed to disentangle whether peer networks play a role in the development of sense of belonging and professional identity, or whether these concepts played a role in the formation of peer networks. To reach this aim, we studied the co-evolution of sense of belonging and professional identity with peer networks by using SAOMs (Snijders et al., 2010; Steglich et al., 2010), similar to Chapter 4. The SAOMs in Chapter 4 however only included social selection effects, while models in Chapter 6 also included social influence effects. In our study, social selection refers to the process where students choose to form ties based on their own and/or others' sense of belonging and professional identity. Social influence refers to the process where students' sense of belonging and professional identity are affected by social ties (Steglich et al., 2010).

RI-CLPMs indicated a significant and positive cross-lagged effect from sense of belonging at T1 on professional identity at T2. This implies that a stronger sense of belonging in September (T1) was related to a positive change in professional identity from September to November (T2). Additionally, RI-CLPMs indicated strong and stable cross-sectional between-person correlations between sense of belonging and professional identity, meaning that students with a strong sense of belonging consistently reported a strong professional identity at all three waves. SAOMs further indicated a dynamic and multifaceted co-evolution process of peer networks and sense of belonging. Firstly, sense of belonging enhanced students' tendency to build new friendship and help-seeking ties with peers – which is similar to our findings in Chapter 4. Secondly, friends appeared to influence each other's sense of belonging, meaning that students' sense of belonging became more similar to their friends' belonging over time. Thirdly, students who were more often asked for help developed a stronger sense of belonging. Lastly, asking more often for help decreased the help-seeking student's sense of belonging. SAOMs of professional identity only indicated a selection effect in the help-seeking network: students preferred to ask help to peers with a similar professional identity.

Our findings on the association between sense of belonging and professional identity are consistent with previous research (Burlison et al., 2021; Chen et al., 2021; Davis et al., 2023) and support sociocultural perspectives on professional identity development in education, which imply a role of students' perception of a personal fit and interpersonal connection within contexts related to their future profession (Holland et al., 1998; Sternszus et al., 2024). Our findings complement these prior studies as well as Chapter 5 of this dissertation, by providing evidence of an effect of sense of belonging on professional identity development over time. It appears that students' sense of belonging in the HE learning environment influences students' identification with their future profession, related to their course programme, to some extent. Yet, in line with findings in Chapter 5, our results again indicated that professional identity remained relatively stable over time and did not change much in response to the transition to HE, as was suggested by previous studies (Burlison et al., 2021; Reid et al., 2008).

Findings on the co-evolution of sense of belonging and professional identity with peer networks provide important new insights, particularly on the meaning and role of students' sense of belonging in HE. Current literature primarily suggests a role of social relationships in enhancing sense of belonging (Anistranski & Brown, 2023; Gilani & Thomas, 2025; Wilcox et al., 2005). We however show that students with a stronger sense of belonging upon enrolment in HE are immediately more active with building social relationships, thereby reversing the causal relationship that is often assumed. Networks of friendships and help-seeking relationships serve as vital sources of social capital needed to succeed in HE (Mishra, 2020), and doubts about one's belongingness can hinder students' access to these valuable resources. Additionally, embeddedness in peer networks, and particularly the help-seeking network, could sustain and deepen students' sense of belonging over time. This suggests a cyclical and mutually reinforcing dynamic between individual perceptions of belongingness and social embeddedness in peer networks. Lastly, our observation that students' sense of belonging becomes more similar to their friends' sense of belonging over time, rather than belongingness being positively related to the number of friends within the course programme, aligns with Bandura's (1986, 2001) emphasis on observational learning and social influence within close-tied networks.

Opportunity gaps and student support in the transition to HE

The general objectives of this dissertation were to 1) identify factors that contribute to opportunity gaps between majority and minority groups of students at different stages of the transition to HE, and 2) study how diverse groups of students can be supported during the transition to HE. The following sections address the two main objectives of this dissertation by, first, identifying factors that contribute to opportunity gaps during the transition to HE, and second, evaluating how diverse student populations can be effectively supported during this critical period.

Formal accessibility of and academic achievement in the HE learning environment

Equitable opportunities to become eligible for and formally enrol into HE course programmes are necessary first steps to ensure that all students, regardless of their background, have a fair chance to access, participate and succeed in HE (Woo et al., 2023; Zwick, 2019). In line with previous research (Dutch Inspectorate of Education, 2023; Fikrat-Wevers et al., 2023, 2023; Mulder et al., 2023; Rosinger et al., 2021), our results show that selective admission procedures can reproduce existing inequities by disadvantaging students with non-Western migration backgrounds in the admissions process. Specifically, we found that when pu-GPA is included in the admissions process, students with these backgrounds are less likely to become admitted. Admissions based on students' motivation to study in HE and a CST could both reduce admission differences related to migration background resulting from grade-based selection. Composite scores, which integrate grade and non-grade measures, have been suggested as a way to reduce structural biases inherent to grade-based selection (Bradburn & Schmitt, 2019; Stegers-Jager, 2018). Integrating both motivation assessments and CSTs into composite scores offers an approach to mitigating the adverse effects of grade-centric selection criteria on minority student groups.

Comparable with similar studies conducted in high-stakes selection contexts (Niessen & Meijer, 2017; Woo et al., 2023), our results however show that measuring students' motivation by open- and closed-ended survey questions is yet a major challenge and leads to admissions decisions based on tests of insufficient predictive validity. An explanation may be that in high-stakes selection contexts, applicants are inclined to give social desirable answers and present idealised versions of themselves, thereby compromising the authenticity and predictive validity of these assessments (Peterson et al., 2011). Furthermore, motivation might not be directly related to GPA, also when measured reliably and validly, but may be more important for students' commitment to the course programme (Isik et al., 2018; Richardson et al., 2012). Compared to results on the assessments of motivation, our results on the CST stem hopeful, because this admissions tool showed no significant score differences between students with and without a migration background and was predictive of students' course grades in HE. By having applicants engage with domain-specific undergraduate-level materials and complete an exam, the CST may thus provide a more equitable pathway into selective HE programmes for students with a non-Western migration background. Yet, considering results from a recent study on HE admission instruments of Fikrat-Wevers and colleagues (2023), who found that applicants with a migration background scored lower on CSTs in some of the investigated procedures, it is important that future research examines how CSTs can be designed to mitigate inequities in admissions procedures.

The diversity-validity dilemma and academic achievement differences

A further important consideration while interpreting the findings and translating them to the HE admissions practice is that the validity of the instruments was assessed by examining the instruments' predictive validity of course grades. As such, Chapter 2 of this dissertation belongs to a tradition of research on HE admissions that is in search of instruments that 1) are predictive of students' academic performance, and 2) enhance fairness by limiting the adverse impact of admissions practices on disadvantaged minority student groups, including students with a migration background (Bradburn & Schmitt, 2019; Pyburn et al., 2008; Stegers-Jager, 2018). Combining these goals is however highly challenging, if not impossible, because disadvantages and opportunity gaps continue to exist in HE, which is reflected by lower course grades among minority student groups (Meeuwisse, 2012; van Rooij et al., 2018; Wolff, 2013). This tension is known as the diversity-validity dilemma: efforts to increase representation of disadvantaged groups in admissions may come at the cost of predictive validity, while highly predictive instruments may disproportionately disadvantage those same groups, reinforcing existing inequalities (Pyburn et al., 2008; Rosinger et al., 2021).

The findings of this dissertation, which reveal disparities in first-year academic performance, further illustrate the inherent tension between the goal of increasing student population diversity and the use of admission instruments aimed at accurately predicting academic success. While not the primary focus of Chapter 2, the results clearly show that students with a non-Western migration background tend to receive lower grades in HE, consistent with previous research highlighting achievement gaps linked to migration background (Meeuwisse, 2012; van Rooij et al., 2018; Wolff, 2013). This helps explain why the admissions instrument with the highest predictive validity (i.e., pu-GPA) also disproportionately reduces the admission chances of these students. Similarly, Chapter 5 demonstrated that first-generation higher education (FGHE) students earned lower grades compared to their continuing-generation (CGHE) peers, a pattern also well-documented in the literature (Helland & Strømme, 2024; López et al., 2023; Spiegler & Bednarek, 2013; Veldman et al., 2023). Although this dissertation did not assess the impact of FGHE status on admissions test performance, earlier studies indicate that FGHE students face barriers to become admitted into selective HE programmes, albeit to a lesser extent than students with a non-Western migration background (Dutch Inspectorate of Education, 2023; Fikrat-Wevers et al., 2023; Mulder et al., 2022b). These parallels suggest that similar structural factors may underlie disparities in admissions outcomes and achievement across both dimensions of disadvantage. Such factors may include unequal access to social and cultural capital needed to navigate selection processes and achieve in education, and limited access to resources such as tutoring, mentoring or informal guidance within students' immediate environments (Mulder et al., 2022a). The CST may present an opportunity to develop admissions instruments that ensure validity while supporting fairness among all student groups.

Overprediction or underserved?

Chapter 2 further adds to prior studies and statistics on achievement gaps in terms of course grades related to migration background by showing that students with a non-Western migration background received lower first year grades than was predicted by their scores on the various admissions tests. Students' pre-university grades and scores on the CST and motivation for psychology assessment all overpredicted first-year academic performance of students with a non-Western migration background. Notably, the assessments of motivation for psychology demonstrated non-significant predictive validity for students with a non-Western migration background, while this instrument did show predictive validity for students without a migration background.

In Chapter 2, we referred to these findings as instances of overprediction (Berry, 2015; Kennet-Cohen et al., 2014). It is however important to consider our findings from a broader educational equity perspective, particularly regarding the transition to HE. Overprediction may suggest that students with a non-Western migration background are not afforded the necessary opportunities within HE learning environments to perform in line with their capabilities - as predicted by their scores on admissions instruments - and may therefore be underserved by HE institutions. In addition to contributing to the growing body of evidence on opportunity gaps in HE, this finding underscores the relevance of this dissertation's broader aim: to identify and examine factors that contribute to these opportunity gaps during the transition to HE, which may ultimately impede the academic success of minority students.

7

Challenges and support at the encounter stage of transition to HE

Understanding how opportunity gaps unfold after admissions requires examining students' experiences during the initial stages of the HE trajectory. In line with prior research, the findings of this dissertation emphasise the critical importance of the encounter stage for explaining student success within the general student population and for identifying mechanisms that may contribute to opportunity gaps. This is not surprising, given that research on educational transitions consistently points to the early stages, when students must navigate a new environment, unfamiliar academic cultures, and novel educational expectations, as especially stressful and formative periods in educational trajectories (Benner, 2011; Coertjens et al., 2017; Gale & Parker, 2014; van Herpen et al., 2020).

The role of student background factors at the encounter stage

With regard to generation in HE-status, the findings across the various chapters suggest that this background factor plays a modest yet meaningful role during the encounter stage of the transition to HE. Specifically, we found that FGHE students had fewer friendships with peers in their course programme during the first months after enrolment. Although the observed

differences in friendship network embeddedness were relatively small, they appear relevant when situated within the broader literature that documents challenges in social integration faced by FGHE students (Almeida et al., 2021; Parnes et al., 2020; Spiegler & Bednarek, 2013; Veldman et al., 2019b, 2023). When students just start in HE, at the encounter stage of transition, they mostly draw on previously acquired social and cultural capital to navigate the norms and culture of HE. This places FGHE students, for whom it is harder to access the social and cultural capital that is rewarded in the HE context, at disadvantage (Leese, 2010; Spiegler & Bednarek, 2013; Veldman et al., 2019a). Similar to findings of Veldman et al. (2023), this dissertation shows that such disadvantages mainly translate into difficulties with social adjustment at an early stage of studying in HE, which in turn may have caused difficulties with achieving academically among FGHE students, as was observed in Chapter 5.

At later stages of the transition to HE, it appears that generation in HE-status influences experiences of first-year students to a lesser extent, for instance as FGHE students become equally embedded in peer networks as compared to CGHE students. Furthermore, in contrast to previous research, results do not show that FGHE students experience less belongingness in the HE context than their CGHE peers at the start of the academic year and results also do not indicate differences in help-seeking behaviour. International research on generation in HE-status – mainly conducted in the US and UK – shows that FGHE students experience lower levels of belongingness in HE (Gopalan & Brady, 2020; Pedler et al., 2022; Pittman & Richmond, 2008; Spiegler & Bednarek, 2013) and are less inclined to ask for help (Bahnsen et al., 2023; Parnes et al., 2020; Schwartz et al., 2018). Recent studies conducted in HE in the Netherlands, like the studies described in this dissertation, however show deviating patterns with these studies. Hulzebos and Munniksma (2022) and Verbree and colleagues (2025) for instance did not find an effect of generation in HE-status on sense of belonging. Furthermore, reviews of factors influencing first year student success have also indicated only limited or mixed effects of generation in HE-status (van der Zanden et al., 2018; van Rooij et al., 2018).

Students' migration background appeared to play a distinct role during the encounter and adjustment stages of the transition to HE. In contrast to the lack of association between generation in HE status and students' sense of belonging, we did find disparities in sense of belonging associated with migration background. Specifically, students with a migration background reported a lower sense of belonging (Chapter 4) during the first few months in HE compared to students without a migration background. Furthermore, while students with a migration background were not less embedded in peer networks, as was observed for FGHE students, migration background did influence relationship formation to some extent, as migration background-related homophily structured relationship formation: students without a migration background predominantly formed ties with peers who also had no migration background, whereas students with a migration background preferred connections with peers who likewise had a migration background.

These findings suggest that the lower sense of belonging at the encounter stage of transition and lower achievement during later stages among students with a non-Western migration background cannot be explained by a lack of structural embeddedness within the peer system of the HE learning environment. Although migration background shaped relationship preferences through homophily, students with a migration background were not less embedded in peer networks overall. Nevertheless, the lower levels of sense of belonging upon encounter of the HE context are a significant and concerning outcome in themselves. A diminished sense of belonging has been shown to negatively affect students' engagement, persistence, and academic success (Gilani & Thomas, 2025; Hausmann et al., 2009; Strayhorn, 2018). This finding thus highlights an important inequity that deserves further attention, even if the precise mechanisms remain unclear. Notably, this dissertation did not systematically examine structural barriers such as discriminatory practices, exclusionary experiences, or misalignment with the dominant culture of HE institutions, all of which could contribute to these patterns (Colak et al., 2023; Hurtado & Carter, 1997; Strayhorn, 2018). It is plausible that such factors play a crucial role in shaping students' experiences and outcomes. Additionally, the preference for building relationships with peers of a similar migration background may reflect a protective strategy, offering emotional safety and support in environments where students may otherwise feel marginalised (Colak et al., 2019).

An overarching conclusion that could be drawn from the results of this dissertation and decades of prior research on factors that contribute to opportunity gaps is that these are rather complex, vary between course programmes and institutional contexts, and that different dimensions of minority status influence experiences and opportunities during the transition to HE in different ways. As such, the results point to a need for research and practice to adopt an intersectional lens to pay close attention to how complexity and heterogeneity within social groups influence the process of transition in interaction with factors in the learning environment. Furthermore, rather than treating social background factors and identities as fixed explanatory categories, it is essential to examine the underlying processes through which educational inequities are produced and sustained. One such mechanism highlighted in this dissertation is sense of belonging to HE, which could offer a more dynamic and contextualised understanding of student experiences, as this concept captures how student interpret their place within the HE context.

Early development and consequences of a sense of belonging in HE

The findings across the studies particularly highlight the central role of sense of belonging in the early phase of studying in HE. The use of longitudinal and social network designs in this dissertation provided critical new insights into the importance of a sense of belonging among first year students, particularly during the encounter stage. Specifically, they show that a strong sense of belonging at the start of the first academic year positively influences the early development of a professional identity (Chapter 6) and facilitates peer relationships

by influencing the extent to which students' actively approach their peers for friendships and academic help (Chapter 4 and 6). This means that students who experience a strong sense of belonging have better access to on-campus social capital, including information and academic and non-academic support, which is important to succeed in HE contexts (Almeida et al., 2021; Brouwer et al., 2016; Mishra, 2020).

The observation in Chapter 4 and 6 of sense of belonging as a driver of individual relationships in the encounter stage of transition to HE has several important theoretical and practical implications. Theoretically, it implies that sense of belonging is not merely an outcome of positive relationships within educational contexts, but also an antecedent that actively shapes students' engagement with their peers. Students who enter HE with a stronger initial sense of belonging appear more capable and motivated to form social ties, thereby reinforcing their social integration and access to relevant and supportive social capital. Practically, this highlights the need for early interventions that foster a sense of belonging from the outset of students' HE trajectory (Walton & Cohen, 2011). Rather than solely promoting relationship-building activities, institutions should also focus on creating welcoming environments and inclusive cultures that affirm students' legitimate presence in HE from the moment of entry, particularly for students from underrepresented backgrounds who may be at greater risk of feeling disconnected.

Supporting students at the encounter stage

Given the early importance of sense of belonging and social integration for academic success, it is critical to consider how HE institutions can support students effectively during the encounter stage. Results from the study in Chapter 3 provide some insights into effective support strategies that HE institutions could adopt to provide this support. This study demonstrates that transition programmes can play a role in promoting belongingness during the encounter stage of transition to HE. Specifically, the PAP appeared effective in supporting students' initial sense of belonging and social connections/social capital development by combining elements of difference-education, acknowledging and affirming students' diverse backgrounds, and by actively fostering peer relationships. By explicitly addressing background-specific challenges, such as feelings of underrepresentation or uncertainty about fitting into the academic environment, the programme helped level the playing field for students from disadvantaged minority groups. Simultaneously, through structured social activities and early network formation, the PAP enhanced opportunities for social integration, thereby strengthening students' access to peer support and on-campus social capital, which are both important for successful adjustment in HE. Importantly, given that Chapters 4 and 6 identified sense of belonging as a driver of peer relationship formation, it is plausible that the components of the programme aimed at fostering a sense of belonging may have been particularly influential in enabling students to build peer networks and support their early academic adjustment.

Another important way to support students during the encounter stage is through small-group and student-centred education. Consistent with prior research (Brouwer et al., 2019, 2022; Mishra, 2020; Severiens et al., 2015), the findings in this dissertation show that such environments create opportunities for students to develop supportive peer relationships. Small tutorial groups in problem-based learning contexts were found to be a proximal setting where students built friendships and help-seeking relations, illustrating the value of creating spaces that facilitate frequent peer interaction. However, although small-group education promotes access to peer networks, it does not automatically remove barriers to developing and experiencing a strong sense of belonging to the HE learning environment. Students still selectively form connections based on academic achievement, migration background, and other individual factors, and students who experience doubts about their belongingness in HE course programmes may remain at risk of feeling disconnected despite increased contact opportunities. Therefore, while structuring environments to support peer connections is important, it must be complemented by deliberate efforts to address the internal, psychological, and structural barriers that inhibit some students' sense of belonging, ensuring that all students truly feel recognised and valued in the HE environment.

Sense of belonging and professional identity development at the adjustment stage

After students' first confrontation with the HE learning environment, and its' norms, culture and expectations, the adjustment stage is assumed in the literature to be a period during which students gradually deepen their knowledge on and may internalise academic norms, expectations, and practices (Coertjens et al., 2017; Nicholson, 1990). Our results show that students' sense of belonging continues to develop during this stage, indicating that students actively reflect on their place within the academic environment – considering whether they feel valued, connected, and fitting in – based on their experiences in the HE context. In line with prior research on belongingness in HE, we showed that peer relationships play a role in this evaluation of students' belongingness in HE, albeit in different and more complex ways than currently discussed in literature on the association between social relationships and sense of belonging (Allen et al., 2021; Gilani & Thomas, 2025; Pittman & Richmond, 2008; Ryan & Shin, 2018).

Peer influence on sense of belonging

Research on the role of peers in educational contexts typically distinguishes between peers as sources of relatedness and support and peers as socialising agents who shape attitudes and behaviours (Ryan & Shin, 2018). Sense of belonging is mainly conceptualised as a positive outcome of feeling socially and academically supported by actors, including peers, in the classroom (Gilani & Thomas, 2025; Ryan & Shin, 2018). However, our findings show that peers

also influence the development of belonging by acting as socialising agents: students' sense of belonging becomes increasingly aligned with that of their friends over time, indicating peer influence. This suggests that friends do more than offer support; they shape how students interpret and engage with the HE context, which is consistent with Bandura's social-cognitive theory (1986). Moreover, we found that students can be well embedded in a friendship network while their own sense of belonging either increases or decreases, depending on the influence of their friends. This implies that students differentiate between having friends in the programme and feeling a sense of belonging to the programme itself. In other words, students may construct their sense of belonging from a wider range of experiences, such as interactions with teachers, representation in course content and staff, and the perceived inclusivity of the learning environment, which are discussed and interpreted within their peer groups. Through these social exchanges, friends shape one another's interpretations of their belongingness in the learning environment, thereby reinforcing or reshaping how students relate to this environment. These findings highlight the agentic role of students and active role of peer networks in shaping belongingness in HE, beyond offering emotional or instrumental support alone.

The results of this dissertation also indicate that students' sense of belonging is further influenced during the adjustment stage of transition to HE by their help-seeking relations. Having access to and using the peer network for academic support by asking other students for help did however not necessarily strengthen sense of belonging, as is suggested by prior research (Gilani & Thomas, 2025; Ryan & Shin, 2018; Shin & Lytle, 2024). Instead, often asking for help led to a decrease in sense of belonging over time, while being asked for help and providing support led to an increase in belongingness. These patterns resonate with an argument by Stephens et al. (2012) that many HE institutions prioritise norms of independence, which can conflict with interdependent norms that some students bring with them. In HE contexts, often seeking help may be interpreted, by oneself or by others, as a sign of being less independent and less competent, leading to students to feeling less accepted and like they only belong in HE when they do not rely on others too much. Conversely, being asked for help and supporting others being positively associated with sense of belonging could perhaps be explained by the way these interactions position students as knowledgeable and competent in the eyes of their peers. This may confer their social status and recognition in the HE learning environment and lead to a stronger sense of belonging.

Professional identity as a protective factor and resource

This dissertation further shows consequences of a professional identity during this stage. Our findings provide evidence that an early professional identity can help students with staying committed to their course programme, and particularly when students may experience difficulties with achieving academically. This adds to prior evidence on the importance of the development of a professional identity (Burlison et al., 2021; Jensen & Jetten, 2016).

Prior studies also suggested that the transition to HE is a formative stage in students' professional identity development (Burlleson et al., 2021; Reid et al., 2008). We did however not find any change in professional identity among the law and psychology students in our samples from these course programmes. Yet, we also did not find a decline in professional identity as Burlleson et al. (2021) did. One possibility for this finding might be that the fact that the course programme under study was a problem-based learning environment helped students with connecting the academic content and theory to professional practice, which helped them to maintain their identification with their future profession (Tan et al., 2016).

This dissertation's findings further suggest that students with a migration background may develop a particularly strong sense of professional identity before and during their time in HE. This suggestion challenges prevailing assumptions that students with a migration background are at risk of weaker professional identity formation due to cultural or systemic barriers (Jensen & Jetten, 2016; Thomas et al., 2023). Instead, drawing on the concept of *funds of identity* (Esteban-Guitart & Moll, 2014; Hogg & Volman, 2020), their migration background can be understood as a source of identity-relevant resources, such as a strong commitment to upward mobility (Clycq et al., 2014), that actively contributes to how they shape and internalise a sense of themselves as future professionals. HE institutions could draw upon these funds of identity to design more inclusive learning environment, curricula, and pedagogical practices that recognise and integrate students' diverse experiences, motivations, and identities into the curriculum. In doing so, HE institutions can move beyond deficit-oriented approaches and instead foster environments where diversity is seen as a strength that enriches academic and professional development for all students. The stronger professional identity that students with a migration background develop could serve as a starting point for HE institutions to engage with and build upon these identity resources in equitable ways (Hogg & Volman, 2020).

Strengths and weaknesses

The studies presented in this dissertation contribute to the literature on opportunity gaps and student support during the transition to HE in several important ways. Firstly, this dissertation explicitly highlights the longitudinal and dynamic character of the transition to HE. By conducting empirical studies across various subsequent stages of the transition and by adopting longitudinal research designs we responded to calls for transition research that capture the processual and evolving nature of educational trajectories (Coertjens et al., 2017; de Clercq et al., 2022; Gale & Parker, 2014; van Herpen, 2019). This longitudinal approach enabled us to uncover critical processes at different phases of transition, rather than focusing solely on static outcomes.

Secondly, a key strength of this dissertation is its dual focus on uncovering opportunity gaps and examining institutional strategies for student support. Rather than merely identifying opportunity gaps, we specifically investigated aspects of the transition to HE that fall within

the realm of influence of HE institutions, such as the design of admissions policies and the implementation of transition programmes to support first-year students. In doing so, this dissertation does not only provide insights into (causes of) opportunity gaps but also indicates whether certain strategies are effective or not to support students.

Thirdly, we expanded the understanding of transition success by moving beyond traditional academic outcomes such as grades, credits, and retention (Melguizo et al., 2021; Richardson et al., 2012; van der Zanden et al., 2018). By investigating how the transition to HE impacts students' sense of belonging and the development of professional identity, we contributed to a more holistic view of student development, acknowledging the complex psychological and social dimensions that underlie academic trajectories. These outcomes are increasingly recognised as critical predictors of persistence and success but are often underexamined in transition research.

Fourthly, this dissertation benefits from the use of multiple data sources and methodological approaches. By combining survey data, student administration records, and sociometric network data, and by employing appropriate longitudinal and social network analysis techniques, we were able to capture processes occurring within real-world HE learning environments without relying exclusively on self-reported measures. In particular, the collection and analysis of social network data provided valuable insights into how peer networks evolve and how factors such as background characteristics, sense of belonging, and professional identity influence students' social integration during the first year of HE.

Despite these strengths, several limitations should be acknowledged. A first limitation concerns the generalisability of the findings to other student populations, course programmes, learning contexts, and HE systems/national contexts. In particular, potential selection effects may have influenced the results, especially in Chapters 3 and 5. While selection bias was less of a concern in Chapters 2, 4, and 6, where we succeeded to collect data from complete or near-complete student populations within specific programmes, the homogeneity of study contexts restricts the extent to which findings can be extrapolated to other disciplines, institutional types, or cultural settings. Future research should seek to replicate these findings across a broader range of educational contexts.

A second limitation relates to the measurement of student background characteristics. Due to reliance on data from the university's educational research database, migration background was operationalised using an outdated classification system from Statistics Netherlands (2022). This may have limited the accuracy and relevance of the analyses, as more recent and nuanced definitions might better capture the heterogeneity of students' migration histories and the personal meaning of such histories. Self-identification measures could offer deeper insights into students' lived experiences and perceived identities within the HE context. Future studies would benefit from integrating self-categorisation approaches to capture the complexity of students' social identities more fully.

A final limitation is the limited attention to intersectionality in the analyses. While this dissertation separately examined the effects of migration background and generation in HE-status, limited sample sizes precluded a systematic investigation of how multiple dimensions of disadvantage may interact. Intersectional perspectives, attending to how overlapping identities such as ethnicity, social class, gender, and generation status jointly shape students' experiences, are increasingly recognised as crucial for understanding opportunity gaps in HE. Future research should therefore adopt designs that intentionally accommodate intersectional analyses, for instance by enlarging sample sizes that allow for quantitative intersectional research or adopting qualitative methods that can capture the complexities of multiple, intertwined identities. Without an intersectional lens, there remains a risk of oversimplifying the challenges faced by diverse student groups and overlooking important within-group differences.

Suggestions for future research

The results of this dissertation, and its strengths and weaknesses, also highlight several avenues for future research to further understanding of opportunity gaps and effective support at the transition to HE. Firstly, in line with our discussion on employing the heightened professional identity among students with a migration background in admissions, studies could explore how admissions processes can better recognise and value the diverse strengths, motivations, and identity resources that students, particularly those from minority backgrounds, bring with them. This includes examining how tools like CSTs or alternative assessments might be designed to capture students' potential for long-term academic engagement and professional growth, rather than short-term performance (e.g., first-year GPA).

Another direction for future research considers the interplay between sense of belonging on the one hand, and the development of peer networks on the other. The role of sense of belonging in network formation that was revealed in this dissertation provides evidence that students – depending on their connection with the HE context – differ in their proactive network behaviours. To study the interplay between sense of belonging and peer networks, studies could adopt methods to uncover student agency in the network. Student agency in networks refers to the capacity of students to appropriate, reproduce, and maybe even change the opportunities, norms, and culture in accordance with their individual and collective beliefs, understanding or commitments (Emirbayer & Mische, 1998; Pantic et al., 2023). Identities, dispositions, competences, resources, and knowledge together constitute student agency; factors which are in turn again produced through relationships (Pantic et al., 2023). Adopting a mixed methods perspective could provide more insight into this process.

Another direction for future research might be the use of quantitative, qualitative, or mixed social network research methods to study the effects of pre-enrolment interventions. One important way in which these interventions appear to support students is by enhancing their

active network behaviours, and as such the mobilisation of social capital. Social network approaches might provide valuable insights into how students build and leverage their networks, identify key actors and relationships that facilitate student success, and measure the impact of these networks on student success and retention. By understanding these dynamics, institutions can better design and implement interventions that foster strong, supportive networks for all students.

Lastly, to be able to support diverse students, it is first and foremost necessary to know where at the transition challenges arise and what factors contribute to success or opportunity gaps between student groups. This requires good quality descriptive data with carefully composed representative samples that contain information not only on study success indicators (e.g., grades, retention, course credits), but also on a wider range of predictors and outcomes, including psychosocial aspects of studying in HE. Although often critiqued, studies such as PISA, PIRLS, and the ICCS in primary and secondary education offer invaluable insights and a starting point for research that is currently largely missing in the field of HE research. Further development of HE research, and particularly the more sociologically oriented research, cannot go without the collection of large-scale representative data. For this, it is necessary that HE institutions, funders, and researchers start collaborating across institutions (and maybe countries) to collect high quality and representative data and, as time and resources should be found somewhere, put less effort in studying single course programmes and institutions.

Practical implications

Reconsidering admissions policies

The findings of this dissertation highlight the need for HE institutions to rigorously evaluate their admissions policies with respect to their aims and instruments. While pu-GPA remains a strong predictor of first-year academic achievement, its use increases opportunity gaps between students with and without a non-Western migration background. CSTs may present a more equitable alternative by reducing score disparities and maintaining predictive validity. Nevertheless, emerging evidence suggests that even CSTs may be associated with inequities depending on the specific content and demands of course programmes (Fikrat-Wevers et al., 2023). Yet, the CST offers a potential starting point for developing selection tools that are both valid and enhance fairness across student groups. To realise this potential, further research and careful design are needed to ensure that CSTs account for diverse forms of (prior) knowledge and learning experiences, rather than unintentionally privileging certain groups over others. Furthermore, HE institutions must consider the outcome they intend to predict through admissions: predicting short-term academic grades may reinforce inequities. For instance, the findings that students with a migration background tend to develop a stronger professional identity and, related to this, a stronger commitment to the programme, suggests

exploring new pathways to foster equity in admissions, by designing and using tests that recognise these long-term motivations and identification stemming from future professional roles related to HE course programmes. This can be done in addition to other pathways that are considered and studied, such as the use of (weighted) lottery.

Early sense of belonging interventions

Given the central role of sense of belonging in shaping students' early academic and social trajectories, HE institutions could support transitioning students by implementation of interventions that foster belongingness immediately upon entry (i.e., the encounter stage). Transition programmes that combine acknowledgement of diverse experiences in HE with structured opportunities for peer interaction, such as the Pre-Academic Programme (PAP), have proven effective in promoting belongingness and enhancing mobilisation of peer social capital. Institutions aiming to support transitioning students could embed structured, belonging-focused interventions into orientation activities and the initial weeks of the transition to HE.

Belongingness in small-group and student-centred learning environments

Small-group and student-centred learning environments provide contexts for promoting peer relationship development and mobilisation of social capital among first-year students. Such settings facilitate the formation of supportive relationships, offering students with opportunities to access on-campus social capital. Nevertheless, the results also indicate that structural proximity alone does not fully suffice to overcome social segregation based on migration background or to eliminate disparities in belongingness. HE institutions should therefore move beyond mere structural design and actively foster meaningful, cross-background interactions within small-group environments. Strategies may include integration of structured activities that promote randomised (and thus diverse) interactions through assignments that require collaboration and training teachers' capacities to create inclusive learning climates. This requires investment in the professional development and training of teachers, equipping them with the skills to recognise social exclusion, facilitate inclusive group dynamics, which subsequently may encourage the formation of peer networks across lines of social and cultural differences. By embedding inclusivity-promoting practices at both the structural and instructional levels, small-group learning environments may foster students' social integration, intercultural peer learning, and the development of inclusive academic communities.

Encouraging help-seeking behaviours

Asking for (academic) help is a key component of self-regulated learning and academic success. However, findings from this dissertation on the negative relationship between asking for help and sense of belonging suggest that HE institutions must take an active role in reshaping how help-seeking behaviours are perceived by actors in the HE context. It is essential that institutions make clear that seeking help is not a sign of incompetence but rather an integral and valued part of the learning process. Institutions should emphasise that asking for help, whether from peers, tutors, or professors, is a normal and productive strategy for overcoming academic challenges and that help-seekers should not doubt about their belongingness in HE. This may be done by explicitly addressing help-seeking strategies during pre-academic programmes, in course materials, or during educational meetings, but also requires a cultural shift in HE that promotes help-seeking as a strength rather than a weakness, and normalises help-seeking behaviours as part of a collaborative and supportive learning environment.

Conclusion

Overall, this dissertation shows that the transition to HE is a formative stage in which structural inequities can be reproduced, but also where targeted support can foster more equitable outcomes. The findings highlight how opportunity gaps for students with a migration background and FGHE status are shaped by institutional processes, such as selective admissions, student support, and the extent to which students are able to access social and academic support in the HE learning environment. A central contribution of this dissertation is the identification of sense of belonging as both an outcome of students' early experiences in HE and a driver of their social integration and professional identity development in HE. Furthermore, the role of professional identity emerges as a protective factor that strengthens students' commitment to their course programme, particularly in the face of academic challenges. Together, these findings emphasise an important role of fostering belonging and becoming for equitable student success: when students feel a sense of belonging, they are more likely to use supportive resources, such as peer support, and develop a strong professional identity – key processes through which they can fully participate in and benefit from opportunities in the HE learning environment. The dissertation provides valuable insights into how HE institutions can better support both majority and minority students in the transition to HE. Future research should continue to explore these dynamics, utilising mixed methods and large-scale representative data to further understand and address the challenges faced by diverse student populations.

Samenvatting

(Summary in Dutch)

Studentenaantallen in het hoger onderwijs (HO) zijn de afgelopen decennia in omvang toegenomen en dat geldt ook voor de diversiteit in achtergronden (Marginson, 2016; OESO, 2024). Hoewel recente prognoses voor Nederland en vergelijkbare landen wijzen op een stabilisatie of zelfs een daling van het aantal studenten in het HO, is de verwachting dat de trend van toenemende diversiteit zal doorzetten. Dit komt bijvoorbeeld doordat een toenemende groep scholieren met een migratieachtergrond naar de havo of het vwo gaat –schoolniveaus die voorbereiden op het HO (Centraal Bureau voor de Statistiek, 2024). Onderzoek laat echter zien dat studenten uit minderheidsgroepen, waaronder eerste-generatie in HO (EGHO) studenten, oftewel studenten met ouders die niet in het HO gestudeerd hebben, en studenten met een migratieachtergrond, minder kansen op succes hebben in het HO vergeleken met meerderheidsgroepen (Gopalan & Brady, 2020; López et al., 2023; OESO, 2024; Spiegler & Badnarek, 2013). Veel HO-instellingen hebben daarom als doel gesteld om de toegankelijkheid en inclusiviteit van hun leeromgevingen te verbeteren (Europese Commissie, 2023).

Eerder onderzoek heeft de transitie naar het HO, wanneer studenten zich voorbereiden op en beginnen met een studie in het HO, geïdentificeerd als een periode waarin de basis gelegd kan worden voor toegankelijke en inclusieve leeromgevingen (Coertjens et al., 2017; Leese, 2010). Het blijft echter onduidelijk welke factoren bijdragen aan kansenongelijkheid tijdens de overgang naar het HO en hoe effectieve ondersteuning voor diverse groepen eerstejaarsstudenten georganiseerd kan worden (Nationaal Regieorgaan Onderwijsonderzoek (NRO), 2024). Dit proefschrift heeft daarom de volgende overkoepelende doelen: 1) het identificeren van factoren die bijdragen aan verschillen in kansen tussen minderheids- en meerderheidsgroepen tijdens verschillende fasen van de transitie naar het HO, en 2) het onderzoeken hoe diverse groepen studenten ondersteund kunnen worden bij deze transitie. Het proefschrift bestaat uit vijf empirische studies die zich richten op verschillende fasen van de transitie naar het HO: van de selectie en toelating voorafgaand aan het instromen in de opleiding tot het opbouwen van sociale netwerken en de ontwikkeling van een *sense of belonging* en professionele identiteit tijdens het eerste jaar in het HO. Elke studie draagt bij aan de overkoepelende doelen van de dissertatie.

Samenvatting van de resultaten

Scoreverschillen en voorspellende waarde van selectiemethoden voor toelating in het Hoger Onderwijs

Tijdens de voorbereidingsfase van de transitie naar het Hoger Onderwijs (HO) kiezen studenten een opleiding en zetten ze de benodigde stappen om te voldoen aan eisen voor toelating. Binnen deze context is het van belang onderscheid te maken tussen opleidingen met open toelating en opleidingen die gebruikmaken van selectieve toelatingsprocedures. Hoewel studenten zich voor veel opleidingen kunnen inschrijven zodra zij aan de basisvereisten voldoen, zoals het behalen van een vwo-diploma voor toelating tot de universiteit, hanteren selectieve opleidingen aanvullende toelatingscriteria en vindt de toelating plaats via een competitief selectieproces. Eerder onderzoek laat zien dat selectieve toelatingsprocedures kunnen leiden tot kansenongelijkheid in het toelatingsproces (Rosinger et al., 2021). Studenten met een niet-westerse migratieachtergrond hebben bijvoorbeeld minder kans op toelating wanneer selectie is gebaseerd op eerdere schoolprestaties, zoals cijfers (Dutch Inspectorate of Education, 2023; Stegers-Jager, 2018).

In **Hoofdstuk 2** werd binnen een selectieprocedure van een bacheloropleiding psychologie onderzocht of andere selectie-instrumenten dan eerder behaalde schoolcijfers de kansenongelijkheid in selectieprocedures verkleinen en in hoeverre alternatieve selectie-instrumenten voorspellend zijn voor de studieprestaties (*grade point average*; GPA) van studenten met en zonder een niet-westerse migratieachtergrond. De alternatieve selectiemethoden die wij bestudeerden waren een *curriculum-sample test* (CST), waarbij deelnemers een toets maakten over onderwerpen uit het eerstejaars psychologie curriculum van de betreffende opleiding, en een motivatie-assessment via een reeks open en gesloten vragen. Daarnaast werd gekeken naar een samengestelde score die bestond uit eerdere schoolprestaties, de CST, en de motivatie-assessments. Het onderzoek maakte gebruik van data uit de selectieprocedure van de opleiding psychologie ($n = 306$).

De resultaten lieten zien dat studenten met een niet-westerse migratieachtergrond lagere eerdere schoolprestaties hadden dan studenten zonder migratieachtergrond. Er werden geen significante scoreverschillen gevonden op de CST, de motivatieassessments, en de samengestelde score. Wat betreft de predictieve validiteit gaven de analyses aan dat eerdere schoolprestaties het meest voorspellend waren voor de studieprestaties (GPA) van studenten in het eerste jaar van de psychologieopleiding. Ook de CST en de samengestelde score waren voorspellend voor GPA. De motivatie-assessments voorspelden GPA niet. Analyses toonden verder aan dat de voorspellende waarde van de verschillende selectie-instrumenten verschilde afhankelijk van de migratieachtergrond van studenten. De eerder behaalde schoolprestaties, de CST, en het motivatie-assessment bleken een overschatting (*overprediction*) te geven van het GPA in het eerste jaar voor studenten met een niet-westerse migratieachtergrond. Dat

wil zeggen, het GPA van deze studenten in het eerste jaar van de psychologieopleiding was lager dan voorspeld op basis van hun behaalde toelatingscores.

Deze resultaten versterken het bewijs dat schoolprestaties zeer voorspellend zijn voor studieresultaten in het HO, maar tegelijkertijd de toelatingkans voor studenten met een niet-westerse migratieachtergrond verkleinen (Fikrat-Wevers et al., 2023; Rosinger et al., 2021; Stegers-Jager, 2018). Motivatie-assessments vergroten de toelatingkans voor studenten met een niet-westerse migratieachtergrond, maar hebben geen voorspellende waarde voor het GPA van studenten tijdens het eerste jaar in het HO (Niessen & Meijer, 2017; Schmitt et al., 2009; Woo et al., 2023). De CST toonde geen scoreverschillen op basis van migratieachtergrond en voorspelde het GPA van studenten. De resultaten omtrent de predictieve validiteit van de CST zijn in lijn met eerdere studies naar vergelijkbare toelatingsinstrumenten (Niessen et al., 2016, 2019; Reibnegger et al., 2010). Onze bevindingen over het ontbreken van scoreverschillen naar migratieachtergrond dragen bovendien bij aan recent werk van Fikrat-Wevers et al. (2023), waarin aangetoond werd dat CST's binnen sommige selectieprocedures wel scoreverschillen lieten zien op basis van migratieachtergrond en binnen sommige selectieprocedures juist niet. Alhoewel de resultaten in deze dissertatie (Hoofdstuk 2) het potentieel van de CST benadrukken als een eerlijker en valide toelatingsinstrument voor het HO vergeleken met selectie gebaseerd op cijfers, is het dus van belang om te onderzoeken wanneer er wel of geen verschillen zijn tussen groepen. Om hier meer zekerheid over te krijgen is onderzoek in grotere en andere steekproeven nodig. In het bijzonder is vervolgonderzoek nodig met steekproeven waarin zowel toegelaten als niet-toegelaten studenten zijn opgenomen.

De effectiviteit van een transitie-interventie voorafgaand aan de opleiding

De kennismakingsfase van de transitie naar het HO is de fase dat studenten net beginnen met hun opleiding, hun eerste ervaringen hebben in de nieuwe HO leeromgeving en de bijbehorende cultuur, en uitzoeken wat er van hen verwacht wordt (Coertjens et al., 2017; Nicholson, 1990; van Herpen, 2019). Aangezien veel studenten de overstap naar het HO als uitdagend ervaren, organiseren veel HO-instellingen tijdens de kennismakingsfase transitieprogramma's om eerstejaarsstudenten te ondersteunen. Onderzoek naar de effectiviteit van dergelijke programma's ontbreekt echter vaak (Leest et al., 2022). In **Hoofdstuk 3** onderzochten we daarom de effectiviteit van een pre-academisch programma (PAP) dat als doel heeft eerstejaarsstudenten te ondersteunen tijdens de kennismakingsfase van de transitie naar het HO. We onderzochten daarbij of het PAP een positieve invloed heeft op belangrijke uitkomstmaten die wijzen op een succesvolle transitie naar het HO (Brooman & Darwent, 2014): *sense of belonging*, academische zelf-effectiviteit (*self-efficacy*), en academische prestaties. *Sense of belonging* verwijst naar het gevoel van studenten dat zij deel uitmaken van de HO-gemeenschap, geaccepteerd worden, en erbij horen (Dias-Broens et al., 2024; Hausmann et al., 2009). In de academische context verwijst *self-efficacy* naar de perceptie

van studenten over hun vermogen om te leren en te presteren binnen de onderwijscontext (Bandura, 1997; Broom & Darwent, 2014). Academische prestaties werden gemeten als het gewogen gemiddelde van de behaalde cijfers in het eerste semester van het HO (GPA).

Eerder onderzoek toont aan dat EGHO studenten specifieke uitdagingen ervaren, zoals verminderde bekendheid met studeren in het HO en toegang tot rolmodellen vanuit hun thuisomgeving en minder zekerheid over hun plaats in het HO in vergelijking met studenten van wie ouders wel aan het HO deelnamen (Volgende Generatie-in het HO; VGHO studenten) (Leese, 2010; López et al., 2023; Spiegler & Bednarek, 2013). Het PAP paste daarom interventiestrategieën toe die specifiek gericht waren op deze uitdagingen. Op basis van literatuur over *difference education* interventies erkende het programma expliciet de invloed van achtergrondkenmerken op ervaringen binnen het HO (Denson, 2009; Stephens et al., 2014). Vanuit onderzoek naar sociaal kapitaalinterventies (Parnes et al., 2020; Schwartz et al., 2018) beoogde het programma ook om deelnemers te ondersteunen in het opbouwen van sociaal kapitaal op de campus. De effectiviteit van deze strategieën werd getoetst door te analyseren of de effecten van deelname aan het programma verschilden tussen EGHO en VGHO studenten, en of effecten op *sense of belonging*, academische *self-efficacy* en prestaties werden veroorzaakt (gemedieerd) door een positief effect op de mate waarin studenten sociaal kapitaal mobiliseerden onder medestudenten en docenten. De effectiviteit van het PAP werd onderzocht via een quasi-experimenteel pretest-posttest onderzoeksdesign. Vanwege COVID-19 werd het programma online georganiseerd.

Multilevel regressieanalyse aan dat PAP-deelnemers een hoger GPA behaalden tijdens het eerste semester in het HO dan niet-deelnemers. Generatiestatus in HO had geen invloed op GPA en de effecten van PAP op GPA verschilden ook niet tussen EGHO en VGHO studenten. Multilevel regressieanalyse met surveydata liet zien dat PAP-deelnemers na deelname een sterkere *sense of belonging* hadden, maar geen verhoogde academische zelfeffectiviteit. We vonden geen effecten van generatiestatus in HO op *sense of belonging* en academische *self-efficacy*. Het PAP had ook dezelfde effecten op deze uitkomsten voor EGHO en VGHO studenten. Tot slot voerden we een pad-analyse uit om te onderzoeken of de effecten van PAP op academische prestaties en *sense of belonging* werden gemedieerd door een effect van PAP op de mobilisatie van sociale hulpbronnen (sociaal kapitaal). Deze analyse liet zien dat PAP-deelnemers meer ondersteunende relaties met medestudenten aangingen, wat vervolgens positief samenhangt met hun *sense of belonging* binnen het HO. Daarentegen zochten PAP-deelnemers niet vaker contact met docenten dan studenten die niet aan het programma deelnamen.

De bevindingen uit Hoofdstuk 3 versterken het bewijs voor de effectiviteit van *difference education* interventies (Stephens et al., 2014; Townsend et al., 2021) en sociaal kapitaal interventies (Parnes et al., 2020; Schwartz et al., 2018). Daarnaast bevestigt onze studie bevindingen van een onderzoek naar een eerdere versie van het PAP waarin ook hogere cijfers en meer interacties met medestudenten werden gevonden onder PAP-deelnemers

(van Herpen et al., 2020). Hoofdstuk 3 toont ook een effect op *sense of belonging* aan - een effect dat van Herpen et al. (2020) niet vonden - en laat zien dat effecten vergelijkbaar waren voor EGHO- en VGHO-studenten. Wel moet worden opgemerkt dat de effecten over het algemeen klein waren en dat selectie-effecten mogelijk een rol speelden, aangezien deelname aan het PAP vrijwillig was. Verdere replicatiestudies, bij voorkeur met gerandomiseerde gecontroleerde onderzoeksopzetten, zijn noodzakelijk.

De ontwikkeling van diverse vriendschaps- en hulpnetwerken

Na de eerste kennismakingsfase van de transitie naar het HO begint de aanpassingsfase (Coertjens et al., 2017; Nicholson, 1990). Tijdens de aanpassingsfase proberen studenten hun weg te vinden in de nieuwe leeromgeving en zich aan te passen aan de bijbehorende verwachtingen. Een belangrijk onderdeel van de kennismakings- en aanpassingsfase is dat studenten voor het eerst in contact komen (of kennismaken) met hun medestudenten, de eerste sociale relaties vormen, en deze geleidelijk aan verder ontwikkelen (Stadtfeld et al., 2019; van Duijn et al., 2003). Deze onderlinge relaties met gelijken (*peers*) zijn van belang voor studentsucces, omdat ze studenten toegang bieden tot sociaal kapitaal (Lin, 2001; Mishra, 2020).

Gezien het belang van peerrelaties voor studieprestaties, is het van groot belang dat studenten de kans krijgen om betekenisvolle sociale relaties met medestudenten op te bouwen. Onderwijsomgevingen die dergelijke 'peernetwerken' stimuleren voor studenten van diverse achtergronden, kunnen daarmee bijdragen aan een inclusievere leeromgeving. Daarbij is het ook van belang dat de netwerken van studenten bestaan uit peers met verschillende achtergronden, zodat studenten toegang krijgen tot diverse vormen van sociaal kapitaal en gebruik kunnen maken van de ontwikkelmogelijkheden die diversiteit binnen studentenpopulaties te bieden heeft (Bowman & Weaver, 2023; Gurin et al., 2002). Recent onderzoek laat echter zien dat studenten uit minderheidsgroepen soms moeite hebben om opgenomen te worden in peernetwerken (Ostrove & Long, 2007; Özbağcı et al., 2023) en dat studenten, ongeacht hun achtergrond, over het algemeen de neiging hebben om relaties aan te gaan met anderen die op hen lijken. Dit leidt tot segregatie binnen netwerken en verminderde toegang tot sociaal kapitaal voor alle studenten (Colak et al., 2019; Weber et al., 2020). Om studenten uit minderheidsgroepen te ondersteunen bij het opbouwen van relaties binnen peer netwerken en om diversiteit binnen deze netwerken te bevorderen, benadrukken onderzoekers het belang van inclusieve leeromgevingen waarbinnen studenten een *sense of belonging* ervaren (Bowman et al., 2019; Wilson et al., 2015).

In **Hoofdstuk 4** werd onderzocht hoe *sense of belonging* en de achtergrondkenmerken generatie-status in HO en migratieachtergrond gezamenlijk bijdragen aan het ontstaan en de verdere ontwikkeling van vriendschaps- en hulpnetwerken binnen een opleiding psychologie. Binnen deze opleiding werd gebruik gemaakt van probleemgestuurd onderwijs

(PGO), wat onder andere inhoudt dat studenten ingedeeld worden in kleine onderwijsgroepen. Deze kleinschalige leeromgeving kan vriendschappen en relaties tussen studenten waarin hulp wordt gevraagd en geboden, bevorderen (Brouwer et al., 2019; Wijnia et al., 2024). Binnen het onderzoek in Hoofdstuk 4 werd gebruik gemaakt van een longitudinale sociale netwerkbenadering (Snijders, 2011; Steglich et al., 2010). Dit houdt in dat studenten op drie momenten in het academisch jaar gevraagd werd met wie ze bevriend waren en wie ze om hulp vroegen binnen de opleiding. Daarnaast werd hen gevraagd aan te geven in hoeverre ze een *sense of belonging* ervoeren binnen de opleiding. De data werden geanalyseerd met Stochastische Actor-geOriënteerde Modellen (SAOMs), die specifiek geschikt zijn om deze combinatie van longitudinale sociale netwerkdata en traditionele surveydata te analyseren (Ripley et al., 2024; Snijders et al., 2010).

De resultaten in Hoofdstuk 4 wijzen erop dat EGHO studenten minder vriendschappen hadden met medestudenten tijdens de kennismakingsfase van de transitie naar het HO. Ook bleek dat studenten met een lagere *sense of belonging* minder actief waren in het vormen van vriendschappen en hulprelaties binnen de eerste fase van hun studie. Of studenten een migratieachtergrond hadden, was niet van invloed op het aantal relaties dat ze hadden met peers. Studenten zochten echter wel vaker contact met peers die, net als zij zelf, al dan niet een migratieachtergrond hebben. Dit was het geval in zowel de vriendschaps- als de hulpnetwerken en gold zowel voor studenten met als zonder een migratieachtergrond. Of studenten een *sense of belonging* ervoeren, verzachtte niet het effect dat generatie-status in HO had op het aantal vriendschappen, en het had ook geen invloed op de voorkeur van studenten om relaties aan te gaan met studenten met net als zichzelf (al dan niet) een migratieachtergrond. Tijdens de aanpassingsfase hadden de achtergrondkenmerken geen invloed op de verdere vorming van de peernetwerken. *Sense of belonging* bleef wel een rol spelen in de vorming van het hulpnetwerk: studenten hadden een voorkeur om hulp te vragen aan peers met een sterkere of vergelijkbare *sense of belonging*.

De resultaten in Hoofdstuk 4 tonen aan dat generatie-status in HO en migratieachtergrond op verschillende manieren de ontwikkeling van peernetwerken beïnvloeden, en dat deze invloed voornamelijk plaatsvindt tijdens de aanpassingsfase van de transitie naar het HO. Tijdens de verdere vorming van de peernetwerken in de aanpassingsfase verdwijnen de effecten van achtergrondkenmerken. EGHO studenten raken even ingebed in de peernetwerken als VGHO studenten, wat erop kan wijzen dat EGHO studenten in de loop van tijd meer vertrouwd raken met de normen en gebruiken in de HO leeromgeving (Milem & Berger, 1997; Rubin, 2012). Tegelijkertijd blijft homofilie (i.e., de voorkeur om relaties aan te gaan met mensen die op je lijken) op basis van migratieachtergrond de peernetwerken structureren. Dit is een effect dat vaak gevonden wordt in sociale netwerkonderzoek (Colak et al., 2019; Weber et al., 2020). *Sense of belonging* leidde niet tot meer connecties tussen studenten van verschillende migratieachtergronden, maar speelde wel een belangrijke rol in de peer netwerken. De positieve invloed van *sense of belonging* op de neiging om relaties aan te gaan en de neiging van studenten om hulp te vragen aan peers met een hogere of vergelijkbare *sense*

of *belonging* bieden belangrijke nieuwe theoretische inzichten, omdat wetenschappelijke literatuur tot dusver *sense of belonging* vooral beschouwt als een uitkomst van sociale relaties en minder als een voorspeller of aanjager van relaties (Anistranski & Brown, 2023; Gilani & Thomas, 2025).

***Sense of belonging* en professionele identiteit in de transitie naar het HO**

De mate waarin studenten ondersteunende peer netwerken en een *sense of belonging* ontwikkelen, is van belang tijdens de kennismakings- en aanpassingsfase. Dit biedt hen het sociaal kapitaal, het zelfvertrouwen, en gevoel van inbedding binnen de HO leeromgeving dat nodig is om te kunnen presteren en zich verder te ontwikkelen als persoon en toekomstig professional (Burlison et al., 2021; Jensen & Jetten, 2016; Mishra, 2020). Waar peer netwerken in Hoofdstuk 4 fungeerde als uitkomstmaat en *sense of belonging* als voorspeller van deze peernetwerken, onderzochten we in Hoofdstuk 5 en 6 hoe zowel *sense of belonging* als peernetwerken bijdragen aan de ontwikkeling van een professionele identiteit (Trede et al., 2012). Een professionele identiteit verwijst hierbij naar de mate waarin studenten zich verbonden voelen met het toekomstige beroepenveld dat gelieerd is aan het vakgebied van hun studie (Tomlinson & Jackson, 2021; Trede et al., 2012). Eerder onderzoek suggereert dat een sterke professionele identiteit studenten al vroeg in de studie kan helpen om gemotiveerd en betrokken te blijven, en daarmee studieuitval kan terugdringen (Burlison et al., 2021; Jensen & Jetten, 2016). Daarnaast is een sterke professionele identiteit van belang tijdens de transitie van het HO naar werk (Tomlinson & Jackson, 2021; Trede et al., 2012). In Hoofdstuk 5 en Hoofdstuk 6 onderzochten wij hoe *sense of belonging*, professionele identiteit en peer netwerken zich gezamenlijk ontwikkelen tijdens de overgang naar het HO. Beide studies vonden plaats in studentgerichte, kleinschalige leeromgevingen, bij respectievelijk rechten- en psychologiestudenten.

In **Hoofdstuk 5** deden wij een onderzoek onder eerstejaars rechten studenten waarbij we surveydata verzamelden aan het begin van het academisch jaar (in september) en aan het einde van het eerste semester (in januari). Hierbij onderzochten we of *sense of belonging* samenhangt met de ontwikkeling van een professionele identiteit, hoe achtergrondkenmerken (migratieachtergrond, generatie-status in HO) hierin een rol spelen, en of professionele identiteit samenhangt met GPA en toewijding om de rechtenstudie af te ronden (*commitment*). Onze analyses met repeated-measures ANOVA toonden een positieve samenhang tussen *sense of belonging* en professionele identiteit, maar geen verandering in professionele identiteit over tijd tussen de twee meetpunten. Studenten met een migratieachtergrond rapporteerden aan het begin van het semester een lagere *sense of belonging*, en later een sterkere professionele identiteit. We vonden geen verschillen tussen EGHO en VGHO studenten met betrekking tot hun *sense of belonging* of professionele identiteit. Professionele identiteit voorspelde niet het GPA van studenten, maar hing wel positief samen met de toewijding van studenten om de rechtenopleiding af te ronden en de intentie om een vervolgopleiding te volgen binnen

hetzelfde veld. Bovendien bleek uit een moderatie-analyse dat professionele identiteit werkte als een buffer: studenten met een laag GPA, maar een sterke professionele identiteit waren even toegewijd om de opleiding af te ronden.

In **Hoofdstuk 6** bouwden we voort op de resultaten van Hoofdstuk 4 en Hoofdstuk 5 door gebruik te maken van een geavanceerd longitudinaal onderzoeksdesign. Hierbij gebruikten we data die op drie momenten verzameld waren onder psychologiestudenten, in september, november, en januari. Met deze data onderzochten we allereerst in hoeverre *sense of belonging* en professionele identiteit wederzijds bijdragen aan elkaars ontwikkeling. Hiervoor maakten we gebruik van *random intercept cross-lagged panel* modellen (RI-CLPMs; Hamaker et al., 2015). Naast de wederzijdse relatie tussen *sense of belonging* en professionele identiteit onderzochten we ook de dynamische en wederzijdse relatie tussen deze twee concepten en de ontwikkeling van peernetwerken. Om de co-evolutie tussen enerzijds peernetwerken (i.e., vriendschappen en hulprelaties) en anderzijds *sense of belonging* en professionele identiteit te analyseren, maakten we gebruik van de SAOMs (Snijders et al., 2010) die we ook gebruikten in Hoofdstuk 4. Echter, in tegenstelling tot Hoofdstuk 4 bevatten de SAOMs in Hoofdstuk 6 niet alleen *selectie* effecten (verwijzend naar de vorming van netwerken; wie selecteren de studenten als peer?), maar ook *invloed* effecten (verwijzend naar de invloed van netwerken op studenten; in hoeverre beïnvloeden de relaties *sense of belonging* en professionele identiteit?) (Steglich et al., 2010).

De RI-CLPMs toonden aan dat *sense of belonging* een positieve invloed had op professionele identiteit aan het begin van het eerste academische jaar. Het ervaren van een sterkere *sense of belonging* helemaal aan het begin van het academisch jaar, net na het instromen in de opleiding, leidde dus tot een versterking van de professionele identiteit. Tegelijkertijd bleek ook uit de analyse dat de professionele identiteit van studenten over het algemeen redelijk stabiel was tijdens het eerste semester in het HO. Uit de SAOMs bleek dat studenten met een sterkere *sense of belonging* actiever waren in het vormen van vriendschappen en hulprelaties. Daarnaast beïnvloedden vriendschappen de *sense of belonging* van studenten, doordat vrienden meer op elkaar gingen lijken wat betreft hun gevoel van *belonging*. Verder zagen wij dat studenten die vaker om hulp werden gevraagd, in de loop van de tijd een sterkere *sense of belonging* ervoerden, terwijl vaker zelf hulp zoeken juist een negatief effect had op *sense of belonging*. Met betrekking tot professionele identiteit bleek uit de SAOMs dat deze identiteit een rol speelt in de selectie van peers: studenten hadden de neiging om hulp te vragen aan medestudenten met een vergelijkbaar sterke professionele identiteit. De peernetwerken hadden geen invloed op professionele identiteit.

Kansenongelijkheid en ondersteuning tijdens de transitie naar het HO

Formele toelating tot studieprogramma's en studieresultaten

Een eerste belangrijke stap naar gelijke kansen op deelname en succes in het HO is het zorgen voor gelijke kansen op formele toegang in studieprogramma's. In navolging van eerder onderzoek (Mulder et al., 2022; Rosinger et al., 2021; Stegers-Jager, 2018) laten de resultaten in deze dissertatie zien dat selectieve toelatingsprocedures bestaande ongelijkheden kunnen bestendigen, ten nadele van studenten met een niet-westerse migratieachtergrond. Specifiek het gebruik van eerdere schoolprestaties als selectie-instrument blijkt de toelatingsscores van studenten met een niet-westerse migratieachtergrond te verlagen, zoals vaker is aangetoond (Fikrat-Wevers et al., 2023; Stegers-Jager, 2018). Alternatieve toelatingmethoden, zoals het gebruik van motivatie-assessment en CST's kunnen scoreverschillen verminderen.

Een andere belangrijke bevinding uit Hoofdstuk 2 is dat studenten met een niet-westerse migratieachtergrond een minder hoog GPA hebben tijdens het eerste jaar in het HO dan studenten zonder migratieachtergrond. Daarbij blijkt uit deze studie dat het GPA van studenten met een niet-westerse migratieachtergrond ook nog eens lager is dan voorspeld door de verschillende selectie-instrumenten. Een verklaring kan zijn dat deze studenten niet de kansen krijgen in de HO leeromgeving om academisch te presteren en hun potentieel waar te maken. Met andere woorden: zij worden mogelijk niet voldoende ondersteund in de leeromgeving van het HO, waardoor bestaande kansenongelijkheid wordt vergroot. Onze resultaten bevestigen eerder onderzoek waarin de relevantie werd aangetoond van de transitie naar het HO als een periode waarin kansenongelijkheid in het HO ontstaat. Deze fase is daarmee ook relevant voor het bieden van adequate ondersteuning aan eerstejaarsstudenten.

De kennismakingsfase in de transitie naar het HO

Om te begrijpen hoe ongelijkheid zich ontwikkelt na toelating, is het belangrijk te kijken naar de beginfase van de studie, de kennismakingsfase (Coertjens et al., 2017; Nicholson, 1990; van Herpen, 2019). Resultaten uit deze dissertatie laten verschillende effecten van achtergrondkenmerken zien tijdens deze kennismakingsfase. Ten eerste blijken EGHO-studenten in de eerste maanden minder vriendschapsrelaties op te bouwen binnen hun opleiding. Hoewel deze verschillen klein zijn, bevestigen ze eerdere bevindingen over uitdagingen met het opbouwen van sociale relaties onder EGHO studenten (Helland & Strømme, 2024; López et al., 2023; Spiegler & Bednarek, 2013; Veldman et al., 2023). Deze studenten beschikken vaak over minder sociaal en cultureel kapitaal dat van waarde is in de HO onderwijsomgeving, wat specifiek in deze fase voor uitdagingen zorgt.

Migratieachtergrond speelt een andere rol: studenten met een migratieachtergrond ervaren significant minder *sense of belonging* in hun opleiding dan studenten zonder migratieachtergrond tijdens de aanpassingsfase. Deze verminderde verbondenheid kan niet verklaard worden door een mindere inbedding in peernetwerken, want zij hadden evenveel ondersteunende relaties als hun peers zonder migratieachtergrond. Wel zagen we dat relatievorming beïnvloed werd door een voorkeur om relaties op te bouwen met anderen met een vergelijkbare migratieachtergrond. Deze bevinding bevestigt eerder onderzoek naar relatievorming in onderwijsomgevingen (Colak et al., 2019; Wimmer & Lewis, 2010).

Het belang van *sense of belonging*, vroege interventies, en een professionele identiteit

Een belangrijk inzicht uit deze dissertatie is dat een sterke *sense of belonging* in de eerste fase van de studie positieve effecten heeft op succes in het HO. Studenten die zich bij de start verbonden voelen, ontwikkelen sneller een professionele identiteit en bouwen gemakkelijker sociale relaties op. Ze hebben zo beter toegang tot sociaal kapitaal, wat hun studiesucces bevordert (Brouwer et al., 2016; Mishra, 2020). Theoretisch betekent dit dat *sense of belonging* niet alleen een gevolg is van sociale relaties, maar ook een oorzaak ervan: studenten die een *sense of belonging* voelen, zoeken actiever vriendschappen en hulp. Dit benadrukt het belang van vroege interventies in de onderwijspraktijk, die gericht zijn op het versterken van verbondenheid, zeker voor studenten uit ondervertegenwoordigde groepen.

Een manier om *sense of belonging* te bevorderen is het aanbieden van transitieprogramma's zoals PAP, dat succesvol bleek in het versterken van *sense of belonging* en sociale integratie. Door de combinatie van aandacht voor diversiteit en het belang van sociaal kapitaal ondersteunt dit programma studenten in de transitie naar het HO. Daarnaast tonen de resultaten het belang van kleinschalig, studentgericht onderwijs, waarin studenten makkelijker relaties kunnen opbouwen. Toch blijkt alleen fysieke nabijheid niet genoeg: psychologische barrières, zoals twijfel over *sense of belonging*, moeten eveneens actief worden verminderd, omdat dit kan leiden tot belemmerde toegang tot sociale hulpbronnen in de HO onderwijsomgeving.

Tot slot toont de dissertatie aan dat een sterke professionele identiteit van invloed kan zijn tijdens de transitie naar het HO, maar dat de professionele identiteit niet veel verandert tijdens deze periode. Studenten die vroeg in hun studie een sterke professionele identiteit ontwikkelen, blijken daarbij meer geëngageerd aan hun opleiding, ook als zij minder goed academisch presteren. Interessant is verder dat studenten met een migratieachtergrond vaker een sterke professionele identiteit ontwikkelen. Om kansgelijkheid te bevorderen, zouden HO instellingen op deze versterkte professionele identiteit kunnen voortbouwen voor het ontwerpen van meer inclusieve leeromgevingen, curricula en pedagogische praktijken die de diverse ervaringen, motivaties en identiteiten van studenten erkennen en integreren in het onderwijs. In plaats van zich te richten op veronderstelde achterstanden, kunnen

instellingen deze sterk ontwikkelde professionele identiteit benutten als bron voor de verdere academische en professionele ontwikkeling van studenten.

Conclusie

Al met al laat dit proefschrift zien dat de transitie naar HO een belangrijke en uitdagende fase is waarin structurele ongelijkheden kunnen worden gereproduceerd, maar waarin gerichte ondersteuning ook kan bijdragen aan eerlijkere uitkomsten. De bevindingen maken duidelijk dat kansongelijkheid voor studenten met een migratieachtergrond en EGHO studenten wordt beïnvloed door institutionele processen, zoals selectieve toelating, support programma's, en de mate waarin studenten toegang hebben tot sociaal en academisch kapitaal binnen de leeromgeving van het HO. Een centrale bijdrage van dit proefschrift is de identificatie van *sense of belonging* als zowel een uitkomst van ervaringen in het HO als een belangrijke voorspeller van sociale integratie en de ontwikkeling van een professionele identiteit. Daarnaast komt professionele identiteit naar voren als een beschermende factor die kan bijdragen aan de betrokkenheid van studenten bij hun studie, vooral wanneer zij te maken krijgen met academische uitdagingen.

Gezamenlijk onderstrepen deze bevindingen het belang van het stimuleren van *belonging and becoming* voor het bevorderen van gelijke onderwijskansen: wanneer studenten een gevoel van verbondenheid ervaren, maken zij meer gebruik van ondersteunende hulpbronnen, zoals steun van medestudenten, en ontwikkelen zij een sterke professionele identiteit. Dit zijn processen waarmee studenten volwaardig kunnen deelnemen aan en profiteren van de mogelijkheden die het hoger onderwijs biedt. De dissertatie biedt waardevolle inzichten in hoe instellingen in het HO zowel meerderheidsgroepen als minderheidsgroepen beter kunnen ondersteunen tijdens de transitie naar het HO. Toekomstig onderzoek zou deze dynamieken verder moeten verkennen, waarbij het gebruik van verschillende typen onderzoeksmethoden (*mixed-methods*) en grootschalige representatieve data essentieel is om de uitdagingen van diverse studentengroepen beter te begrijpen en aan te pakken.



Addendum

List of appendices:

- Appendix A.** Items to measure core variables in Chapter 3.
- Appendix B.** Cross-lagged panel models of sense of belonging and professional identity.
- Appendix C.** Parameters included in stochastic actor-oriented models in Chapter 6.
- Appendix D.** Assessing goodness-of-fit of stochastic actor-oriented models.
- Appendix E.** Goodness of fit results sense of belonging – friendship model
- Appendix F.** Goodness of fit results sense of belonging – help-seeking model
- Appendix G.** Goodness of fit professional identity – friendship model
- Appendix H.** Goodness of fit results professional identity – help-seeking model

Appendix A Items to measure core variables in Chapter 3

Academic self- efficacy	<p>I am certain I can understand the most difficult material presented in the readings of the course programme.</p> <p>I believe I will receive good grades during the first year.</p> <p>I am confident I can understand the basic concepts taught in the course programme.</p> <p>I am confident I can understand the most complex material presented in the course programme.</p> <p>I am confident I can do an excellent job on the assignments and exams in the course programme.</p> <p>I expect to do well in the first year.</p> <p>I am certain I can master the skills being taught in the course programme.</p> <p>Considering the difficulty of the course programme and my skills, I think I will do well in the course programme.</p>
Sense of belonging in HE	<p>I feel at home at this university</p> <p>I enjoy the atmosphere at this university</p> <p>I enjoy participating in educational meetings of my educational programme</p> <p>I do not feel that I belong at this university</p> <p>I am different in comparison with other students at this university</p>
Formal faculty interactions	<p>Teachers approach me to enquire about my study progress</p> <p>Teachers are available for their students</p> <p>Teachers know my qualities</p> <p>Teachers have time to answer questions</p> <p>Teachers don't realize when you have a question</p> <p>My contacts with teachers have a positive influence on my academic performance</p>
Informal faculty interaction	<p>Teachers are not interested in my personal situation</p> <p>Teachers tell me about themselves</p> <p>Teachers don't know much about my personal situation</p> <p>Teachers know my name</p> <p>Teachers never ask me how things are going at home</p> <p>I talk about my personal situation with teachers</p> <p>I have good personal contact with at least one teacher</p>
Formal peer interactions	<p>Fellow students invite me to work together on school tasks</p> <p>It is difficult to find a group of students to collaborate with</p> <p>In this program, students work on their own</p> <p>Peer students approach me to discuss study tasks</p> <p>Peer students do not appreciate my feedback</p> <p>Peer students listen to my remarks</p> <p>I collaborate well with fellow students</p> <p>My interpersonal relationships with fellow students have a positive influence on my study performance</p>
Informal peer interactions	<p>I hardly know anyone in my course programme</p> <p>Fellow students are interested in me</p> <p>Fellow students often ask me to spend time with them</p> <p>Peer students are involved with me</p> <p>I have close interpersonal relationships with fellow students</p>

Appendix B: Cross-lagged panel models of sense of belonging and professional identity

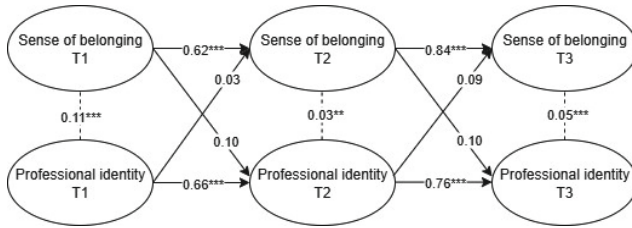


Figure A1. CLPM with sense of belonging and professional without random intercept. Significant autoregressive paths were found for sense of belonging and professional identity, but no significant cross-lagged paths were found. Model fitted the data poorly: $\chi^2(4) = 36.433$, $p = 0.000$; CFI = 0.945; RMSEA = 0.184

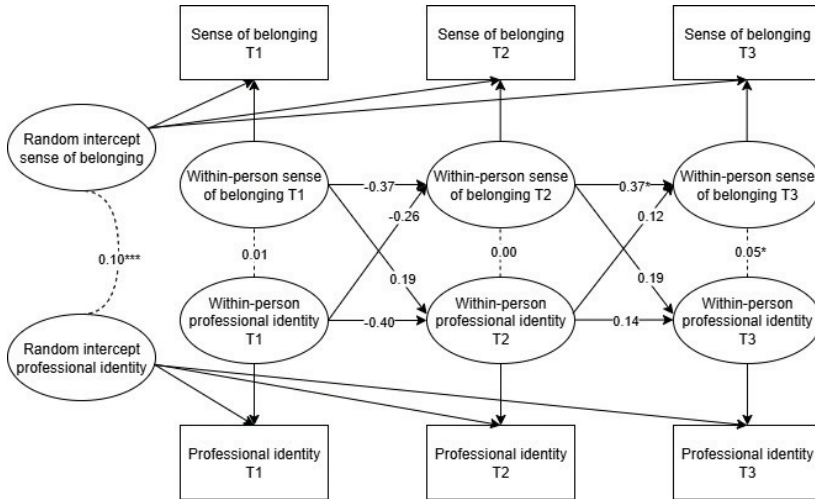





Figure A2. RI-CLPM with sense of belonging and professional identity without constraints. No significant autoregressive or cross-lagged paths were found. Fit indices indicate overfitting (Kline, 2011): $\chi^2(4) = 36.433$, $p = 0.000$; CFI = 0.945; RMSEA = 0.184.

Appendix C Parameter estimates included in Chapter 6

Table B2. Parameters in SAOMs predicting tie or attribute changes.

Parameter	Graphical presentation		Explanation (effectname in <i>RSiena</i>)
	Time t	Time $t + 1$	
Outdegree			Student i connecting to alter j {density}
Reciprocity			Student i reciprocating ties to alter j {recip}
Transitive Triplets			Student i extending ties to alter j to whom she is indirectly tied via mutual connection h {transTrip}
Reciprocated Transitive Triplets			Student j reciprocating ties to student i to whom she is directly and indirectly tied via mutual connection h {transRecTrip}
Indegree popularity			Students with many incoming connections attract more incoming connections {inPop}
Outdegree activity			Students with many outgoing connections nominate other students more {outAct}
Indegree activity			Students with many incoming connections nominate fellow students more {inAct}
Out-isolate			Students who have no connections nominate no other fellow students
Attribute alter			Student with higher values on an attribute (v) attracts more incoming connections {altX}
Attribute ego			Student with higher values on an attribute (v) nominate other fellow students more {egoX}
Same Attribute			Student nominate fellow student who has the same values on an attribute {sameX}
Similarity Attribute			Student nominate fellow student who has similar values on an attribute {simX}
Linear Shape			Tendency of students to change in belonging or professional identity {linear}

Table B2. Parameters in SAOMs predicting tie or attribute changes. *(continued)*

	Graphical presentation	Explanation (effectname in <i>RSiena</i>)
Quadratic Shape		Tendency of students to change in belonging or professional identity (quad)
Attr. Ego		Students with a higher value on an attribute change in belonging or professional identity (effFrom)
Average Similarity		Students tend towards similar values of belonging or professional identity as his/her friend (avSim)

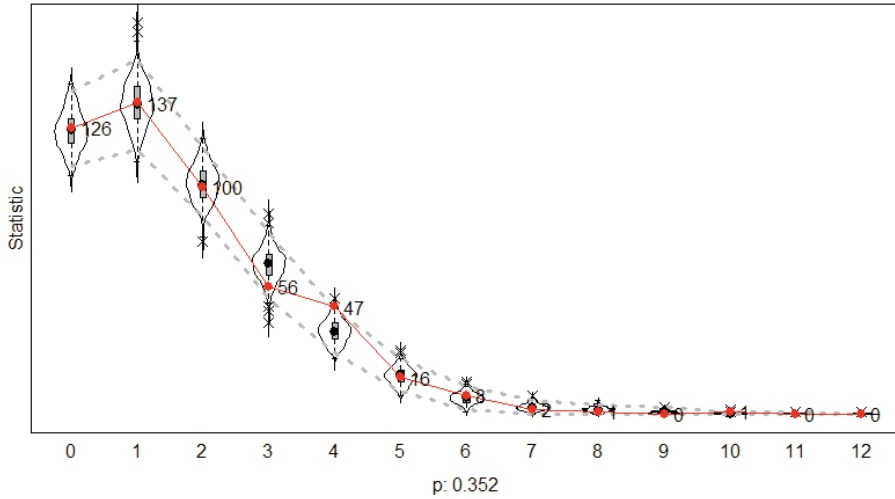
Appendix D Goodness of fit of stochastic actor-oriented models in Chapter 6

We assessed the goodness of fit (GOF) with auxiliary statistics to assess whether the SAOMs reproduced the observed data well enough. We computed the following auxiliary statistics: indegree distribution, outdegree distribution, triad census, behavioural distributions, and network autocorrelation coefficients (Moran’s I). The fit of the SAOMs is good if the auxiliary statistics, which are calculated based on the actual network data, are well-captured in a sample of networks simulated according to the estimated models (reported in SAOM results tables 3 and 4 in the manuscript). For each of these statistics, the differences between the values in the observed network (summed across the two waves of data in each period for each school) and the estimated values for each model (summed across the 5,000 simulated networks) are assessed with the Mahalanobis distance (Ripley et al., 2024). Fit for a particular statistic is good or acceptable when the Mahalanobis distance is small. Assessment of goodness of fit with auxiliary statistics is essential to interpret the effects of main interest.

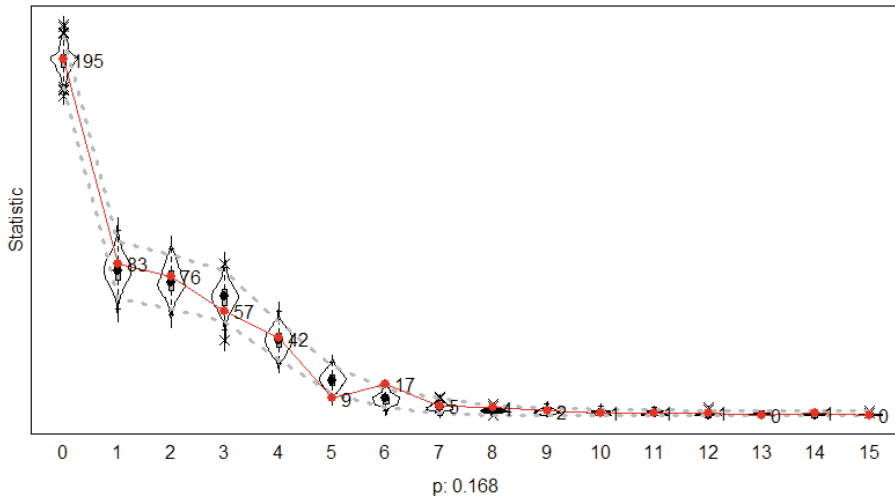
The violin plots in Figure S5 in can be used for a graphical inspection of the departure of the simulated values from the observed value with a five percent margin of error. The red solid lines shows the observed values; the boxplots and violins show the distribution of the simulated values. Fit was satisfactory for out/indegrees and school belonging as the simulated values follow from the observed value of the statistics. Fit for triad census—representing local subgroup structures (friendship groups)—was generally speaking acceptable, but less so for the help-seeking networks.

Appendix E Goodness of fit results sense of belonging – friendship model

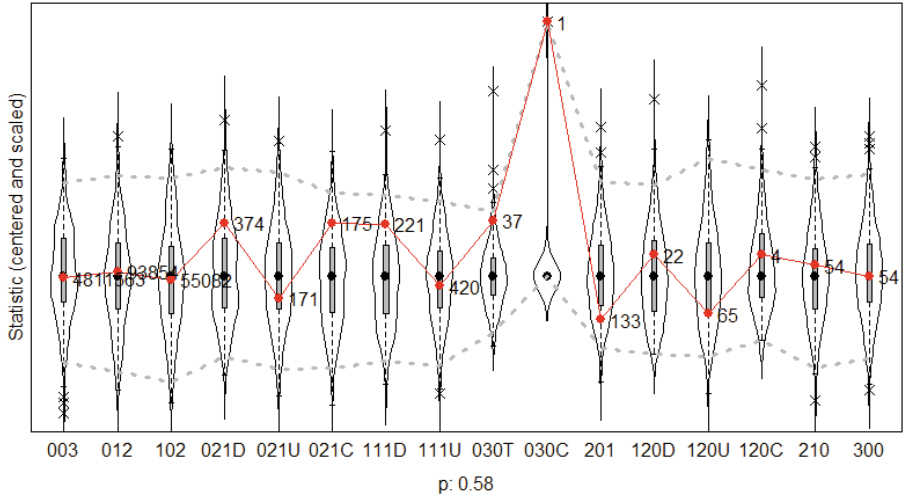
Goodness of Fit of IndegreeDistribution



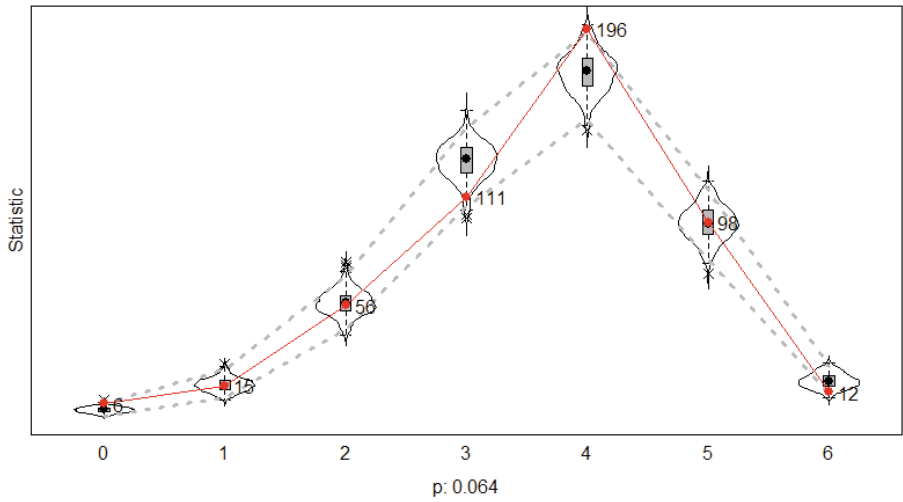
Goodness of Fit of OutdegreeDistribution



Goodness of Fit of TriadCensus

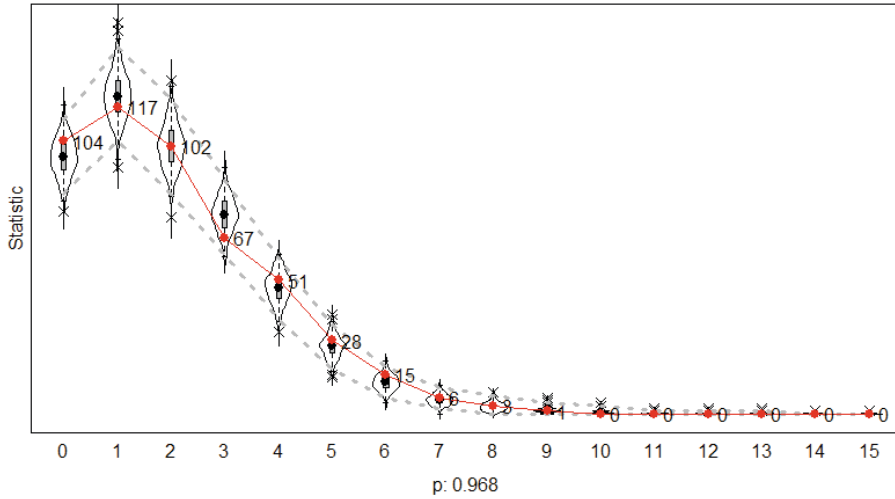


Goodness of Fit of BehaviorDistribution

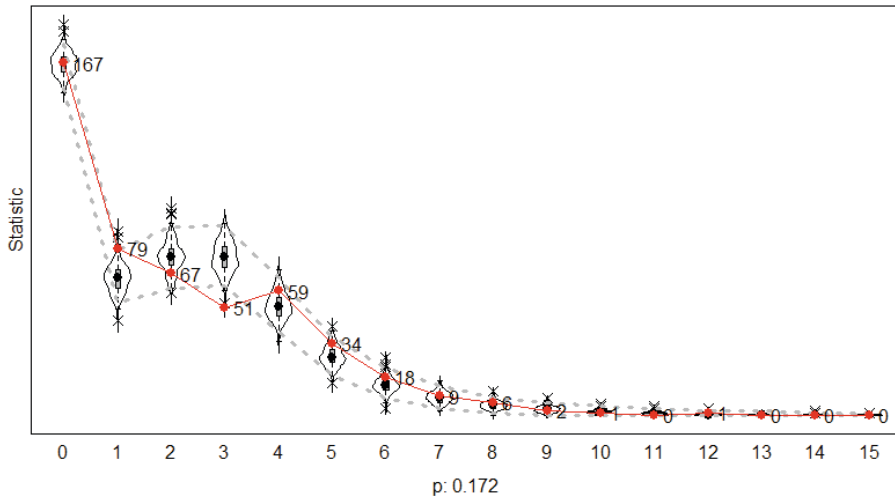


Appendix F Goodness of fit results sense of belonging – help-seeking model

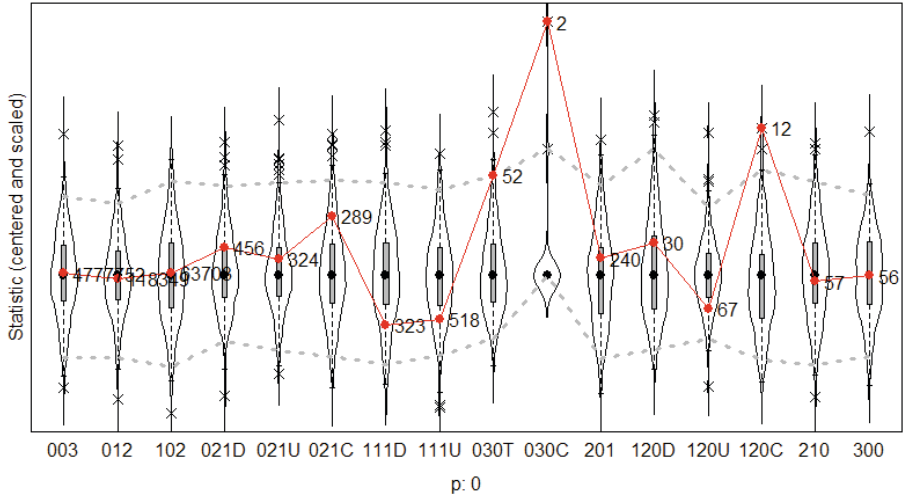
Goodness of Fit of IndegreeDistribution



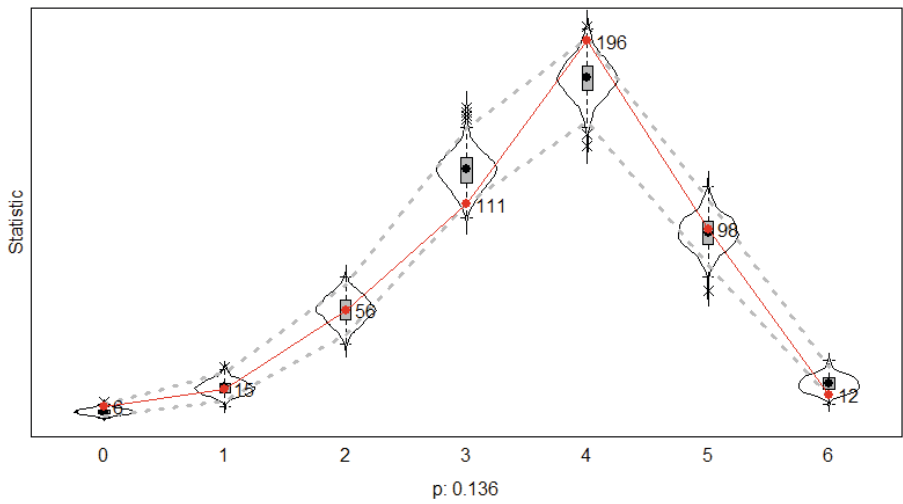
Goodness of Fit of OutdegreeDistribution



Goodness of Fit of TriadCensus

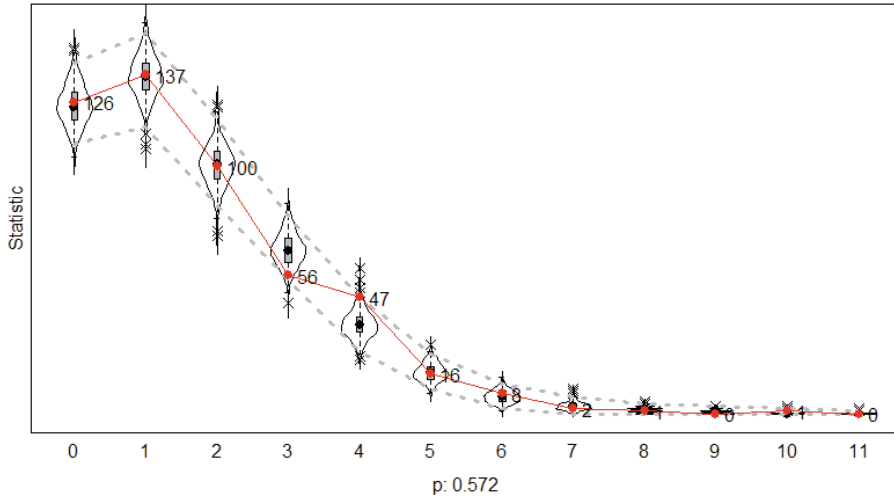


Goodness of Fit of BehaviorDistribution

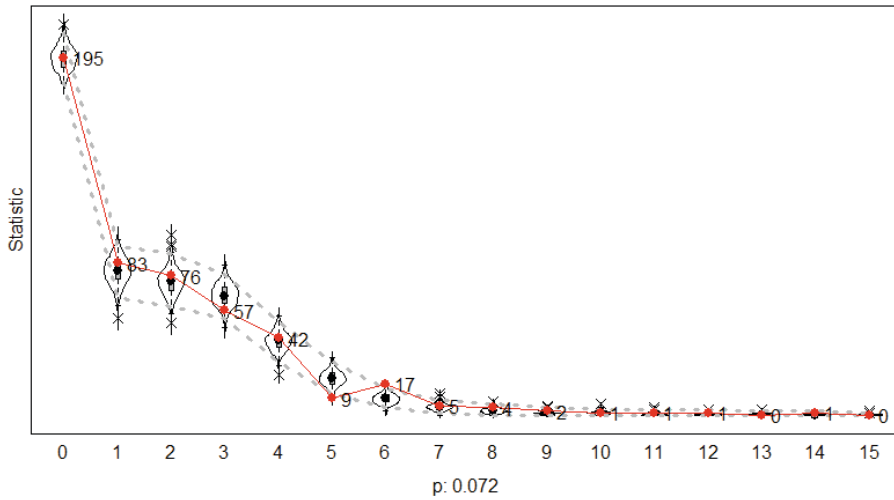


Appendix G Goodness of fit results professional identity – friendship model

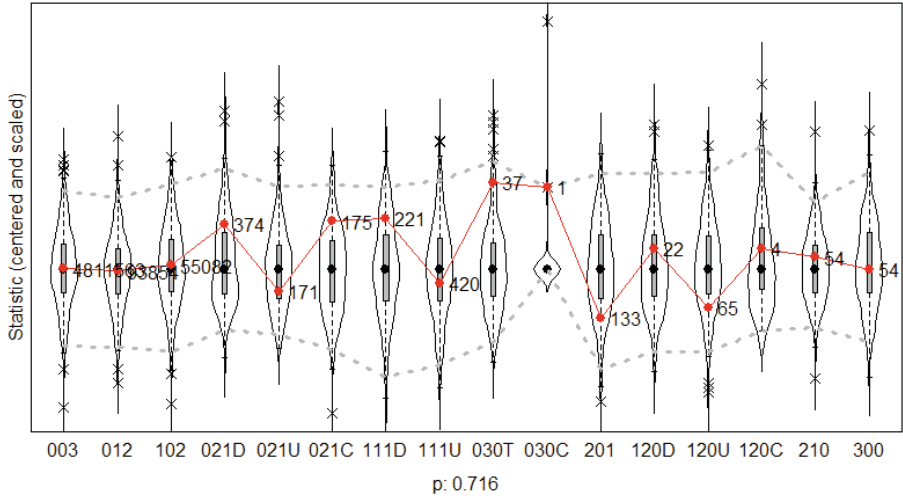
Goodness of Fit of IndegreeDistribution



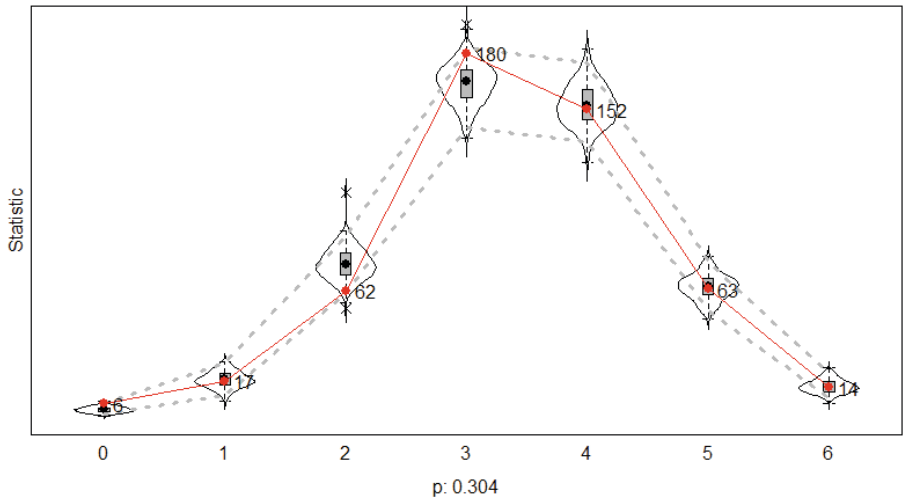
Goodness of Fit of OutdegreeDistribution



Goodness of Fit of TriadCensus

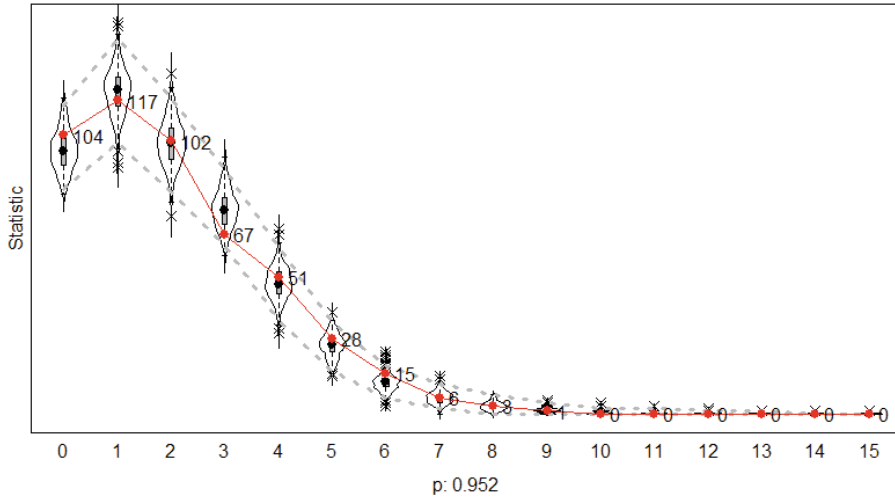


Goodness of Fit of BehaviorDistribution

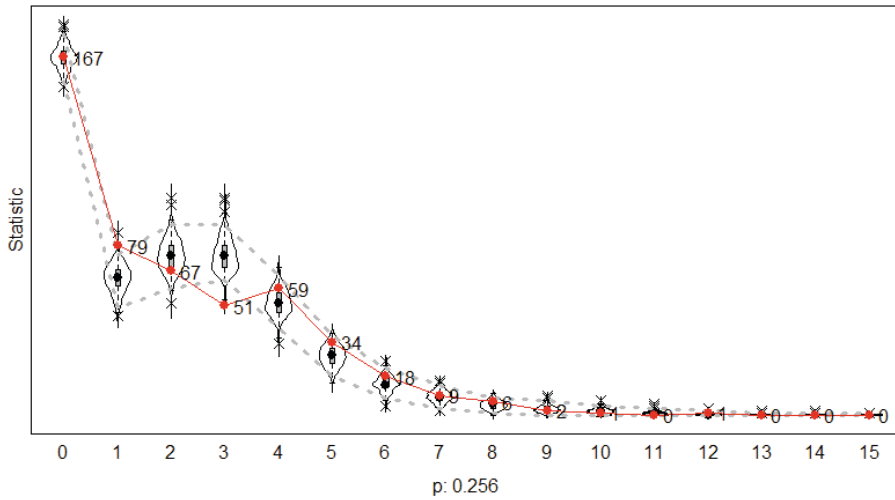


Appendix H Goodness of fit results professional identity – help-seeking model

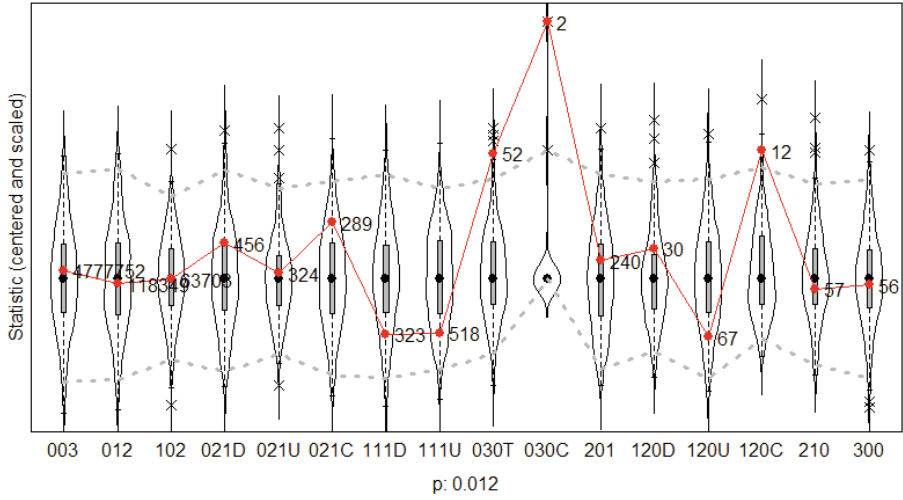
Goodness of Fit of IndegreeDistribution



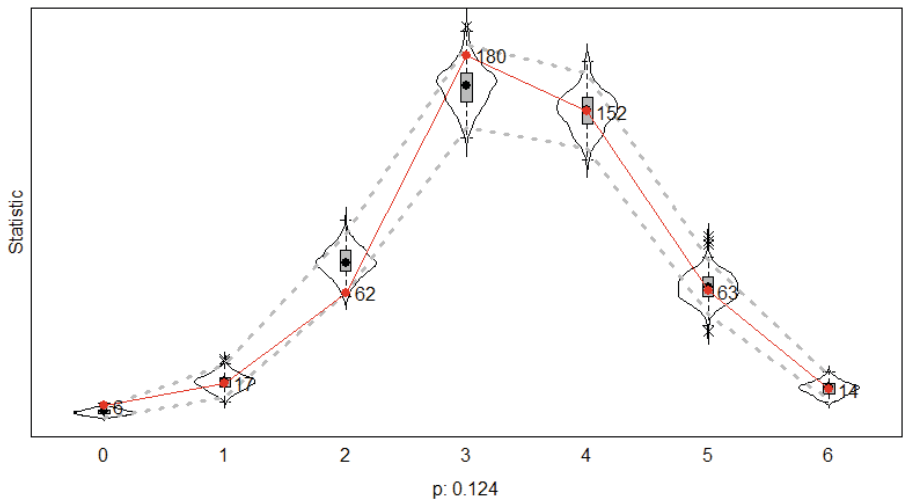
Goodness of Fit of OutdegreeDistribution



Goodness of Fit of TriadCensus



Goodness of Fit of BehaviorDistribution



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About the author

Pieter van Lamoen was born on February 18, 1996, in Utrecht, the Netherlands, after which he grew up and completed his secondary education in 2014 in Gorinchem. He went on to study Political Science at Radboud University, where he obtained his Bachelor's degree in 2018. During his undergraduate studies, he also participated in the Honours Programme of the Faculty of Management Sciences. In 2020, he completed a Research Master's in Social and Cultural Science at the same university, with a specialisation in quantitative Sociology. His Master's thesis focused on the effects of an open classroom climate on adolescents' political engagement. During his studies, he worked as a guest teacher for ProDemos and as a teaching assistant at Radboud University. Pieter began his PhD in 2020 at Erasmus University, studying opportunity disparities in the transition to higher education. During his PhD trajectory, Pieter was a member and chair of the organising committee of the department's Graduate Research Day and a PhD representative of the ICO Higher Education theme group. He also taught and co-developed courses on research methods and diversity in education and supervised theses and internships in the bachelor and master programmes of the Erasmus School of Social and Behavioural Sciences.

Publications

- van Lamoen, P.M., Meeuwisse, M., Hiemstra, A.M.F., Arends, L.R., Severiens, S.E., Brouwer, J. (2025). The role of student background characteristics and sense of belonging in the development of peer networks at the transition to higher education. *Social Psychology of Education* 28(21). <https://doi.org/10.1007/s11218-024-10014-4>
- Meeuwisse, M., van Lamoen, P.M., van Herpen, S.G.A. (2024). Een goede start in het hoger onderwijs. *Onderwijskennis*. <https://www.onderwijskennis.nl/kennisbank/een-goede-start-in-het-hoger-onderwijs>
- van Lamoen, P.M., Hiemstra, A.M.F., Meeuwisse, M., Arends, L.R., Severiens, S.E. (2025). Ethnic-based score differences and differential prediction of various cognitive and noncognitive admissions instruments in higher education. *International Journal of Selection and Assessment*. <https://doi.org/10.1111/ijsa.12501>
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Submitted manuscripts

- Van Lamoen, P.M., Meeuwisse, M., Hiemstra, A.M.F., Arends, L.R., Severiens, S.E., Brouwer, J. (under review). Belonging and becoming: a longitudinal social network study at the transition to higher education. *Learning & Instruction*.
- van Lamoen, P.M., Hiemstra, A.M.F., Meeuwisse, M., Arends, L.R., Severiens, S.E. (under review). Professional identity development and sense of belonging of diverse students at the transition to law school. *Studies in Higher Education*.

Conferences and (invited) talks

- van Lamoen, P.M., Meeuwisse, M., Hiemstra, A.M.F., Arends, L.R., Severiens, S.E., Brouwer, J. (2024). The role of student background characteristics and sense of belonging in the development of peer networks at the transition to higher education. Paper presentation at EARLI SIG 4 & 16 Conference. Utrecht, the Netherlands, 25-27 August 2024.
- van Lamoen, P. M., Brouwer, J., Meeuwisse, M., Hiemstra, A.M.F., Arends, L.R., Severiens, S.E. (2024). Peernetwerken in de transitie naar het hoger onderwijs: De invloed van achtergrondkenmerken en sense of belonging. Poster presentation at Onderwijs Research Dagen (ORD) 2024. Tilburg, the Netherlands, 10-12 July 2024.
- van Lamoen, P.M., Brouwer, J., Meeuwisse, M., Hiemstra, A.M.F., Arends, L.R., Severiens, S.E. (2024). The role of family background and sense of belonging in peer network formation of first-year Psychology students. Paper presentation at ESSB Graduate Research Day, 11 April 2024.
- van Lamoen, P.M., Meeuwisse, M., Hiemstra, A.M.F., Arends, L.R., Severiens, S.E. (2023). Professional identity development and academic success during the transition to higher education. Poster presentation at European Association for Research in Learning and Instruction (EARLI). Thessaloniki, Greece, 22-26 August 2023.

- van Lamoen, P.M., Hiemstra, A.M.F., Meeuwisse, M., Arends, L.R., Severiens, S.E. (2023). Inclusive admission: Adverse impact and predictive bias of various university admission instruments. Poster presentation at JURE Conference for Research on Learning and Instruction. Thessaloniki, Greece, 20-21 August 2023.
- van Lamoen, P.M. Hiemstra, A.M.F, Meeuwisse, M., Arends, L.R., Severiens, S.E. (2023). Professionele identiteitsontwikkeling in de transitie naar het hoger onderwijs. Paper presentation at Onderwijs Research Dagen (ORD) 2023. Amsterdam, the Netherlands, 5-7 July 2023.
- van Lamoen, P.M., Meeuwisse, M., Hiemstra, A.M.F., Arends, L.R., Severiens, S.E. (2023). The impact of a pre-university intervention on students' transition to higher education. Paper presentation at ICO International Spring School 2023. Blankenberge, Belgium, 8-12 May 2023.
- van Lamoen, P.M., Holvast, N., Kortleven W. (2023). Professional identity at the Erasmus School of Law. Invited symposium at the Community for Learning and Innovation (CLI). Rotterdam, the Netherlands, 19 January 2023.
- van Lamoen, P.M., Hiemstra, A.M.F., Meeuwisse, M. Arends, L.R., Severiens, S.E. (2022). Inclusive enrolment: Predictive validity and adverse impact of various admission instruments used in a higher education bachelor programme. WAOP Conference. Tilburg, the Netherlands, 18 November 2022.
- van Lamoen, P.M., Meeuwisse, M., Arends, L.R., Severiens, S.E. (2022). The impact of a pre-university intervention on diverse students' transition into higher education. Paper presentation at EARLI SIG 1 & 4 Conference. Cadiz, Spain, 27-30 June 2022.
- van Lamoen, P.M., Hiemstra, A.M.F., Meeuwisse, M., Arends, L.R., Severiens, S.E. (2022). Adverse impact and differential prediction by curriculum samples and pre- university GPA. Poster presentation at ICO National Spring School 2022. Online, 17-18 March 2022.
- van Lamoen, P.M., Meeuwisse, M., Hiemstra, A.M.F. (2021). Supporting students during an online start in higher education. Conference on Resilience and Recovery after COVID-19. Online, 19 May 2021.
- van Lamoen, P.M., Thijs, P., Spierings, N. (2020). The moderating capability of the open classroom climate: does socioeconomic classroom composition matter? Paper presentation at Politicologenetmaal. Online, 15-16 October 2020.

Grants and awards

- 2024 JURE Best Paper Award at the EARLI SIG 4 & 16 Conference on higher education and methodology in educational research for contribution: *The role of student background characteristics and sense of belonging in the development of peer networks at the transition to higher education.*
- 2023 NPO grant (€6061) for research on the role of peer networks in the transition to higher education.

Graduate courses and professional development

Winter School on Longitudinal Social Network Analysis (3 ECTS)

Courses at the Interuniversity Center for Educational Sciences (ICO)

- Philosophy of Education (3 ECTS)
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Pieter

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