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Growth mindset and its predictive validity : do migration background and academic validation matter?

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# Growth Mindset And Its Predictive Validity - Do Migration Background And Academic Validation Matter?<sup>1</sup>

Key Words:

Growth mindset, migration background, academic validation, Self-system of Motivational Development, academic achievement, at-risk students

## **Abstract**

A wide range of mindset interventions have been designed to tackle the educational gap and improve the academic achievements of underperforming students. These interventions often target small student samples in experimental or homogeneous educational settings. This paper will explicitly emphasize the role of context in the relationship between growth mindset and academic achievement in order to optimize the potential impact of mindset interventions. Based on the Self-System of Motivational Development, we offer a framework which allows for investigating the mediating function of growth mindset between the contextual factors of ‘minority background’ and ‘academic validation’, as well as students’ levels of academic adjustment and academic outcome. Our data, drawn from survey research (N=1549) in a Belgian university, indicate both an inverse, negative effect of mindset on academic outcomes — with little impact of context on mindset — as well as positive effects of academic validation on academic outcome among minority students. These results suggest that academic outcome depends on more than whether students are located on the positive or negative side of the mindset spectrum.

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## **Introduction**

A large body of empirical studies in higher education have found that some groups of students have a significantly lower chance of attaining academic success. These studies generally indicate that ethnic minority students are less successful compared to their peers who are not from an ethnic minority background. In the US, for example, research found that ethnic minority students earn fewer credits (Swail, 2003) and obtain lower grades (Borg & Stranahan 2002; Dennis, Phinney & Chuateco, 2002; Horn, Peter, & Rooney, 2002). In the UK, multiple studies based upon UK-domiciled graduates confirm that students from ethnic minorities are less likely to obtain passing grades (Broecke & Nichols 2007; Connor, et al. 2004; Cotton, et al. 2016; Fielding, et al. 2008; HEFCE, 2018; Leslie, 2005; Naylor & Smith 2004; Richardson, 2008b, 2015). In the Netherlands, research suggests that ethnic minority students obtain fewer credits (Meeuwisse, Severiens & Born 2010; Severiens & Wolff 2008), have lower completion rates (Van den Berg & Hofman 2005) and take longer to graduate (Hofman & Van den Bergh 2003; Severiens, ten Dam & Blom 2006; Zorlu, 2013).

Pre-entry factors such as prior attainment, gender, age or socio-economic status are frequently called upon to explain the ethnic performance gap of students in higher education (Richardson, 2015). While some authors claim that underperformance of ethnic minority students can be attributed mostly to their weaker pre-entry characteristics (Connor, et al. 2004), others suggest that ethnic-specific disparities in academic performance remain substantive, even after correcting for pre-entry variables (Broecke and Nicholls 2007; Richardson 2008b; Van den Bergh and Hofman, 2003).

While pre-entry characteristics alone do have a measurable impact on study success, these factors more often than not intersect with ethnicity (Richardson, 2008a; Strand, 2014). Nuanced

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accounts of academic achievement must therefore look beyond ‘the deficit model’ (Cotton et.al., 2015) and focus on social or cultural factors when trying to explain the achievement gap. Cotton et al. (2015) show that ethnic minority students experience difficulties judging their academic attainment and often overestimate their chances of achieving high scores on exams, attributing this effect to a lack of understanding of the higher education system. Ethnic minority students are more likely to fall back on social networks which do not sufficiently prepare them for higher studies. Moreover, research by Severiens and Wolff (2009) and Meeuwisse, Severiens and Born (2010) emphasizes the importance of contextual variables such as the learning environment (class and school climate) when interpreting the disparities in academic attainment of ethnic minority students. In fact, a number of studies have pointed out that not adjusting properly to the social and academic environment is an important reason for higher drop-out rates among these students (e.g. Cohen & Garcia 2005; Hurtado, Cuellar & Guillermo Wann, 2011; Swail, 2003).

There is a growing body of research aimed at decreasing the ‘attainment gap’. As such, numerous higher educational institutions have designed and implemented student-specific interventions. Often, these interventions focus on fostering a ‘shared sense of belonging’ among students or improving specific academic goals (e.g. Flores, 2014; Cuseo, 2005; Hurtado, 2013; Morisano, et al., 2010). Notwithstanding the high number of interventions, there seems to be no consensus on which ones are effective and which merely function as boutique remedies (Chang, et al., 2006; Paunesku et al., 2015).

An oft-cited exception is a type of student intervention focusing on ‘growth mindset’ (e.g. Aronson, Fried & Good, 2002; Good, Aronson & Inzlicht, 2003). Growth mindset interventions are directed towards increasing learners’ self-beliefs concerning their potential to develop personal skills and abilities. When this belief or ‘implicit theory of intelligence’ is focused on growth, students are shown to be more academically motivated and more eager to engage in

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challenging learning situations. A student with a fixed mindset, on the other hand, believes that his academic abilities are a given, and therefore cannot be changed through experience or incremental learning (Aronson, Fried & Good, 2002; Dweck, 1999; Dweck, 2006; Yeager, et al., 2016).

There are a significant number of academic mindset interventions which investigate the possibility of improving the academic achievements of underperforming students in general (e.g. Burnette, et al., 2013; Dweck, Walton & Cohen, 2015), and others specifically focusing on students from a minority background (e.g. Nichols, White & Price, 2006; Aronson & Steele, 2005). For example, in an oft-cited article Aronson, Fried and Good (2002) describe how African-American college students were able to improve their results (GPA) after an intervention which aimed at changing students' mindset from a fixed to a growth.

Yet despite these studies' valuable contributions to the fields of social psychology and educational theory, they rarely go beyond (quasi-)experimental studies, require a large researcher input, often target small student samples, and do not take place in realistic, heterogeneous educational contexts (see e.g. Walton, 2014; Yeager, et al., 2014; 2016 for a similar critique).

This article deals with the limitations of existing research on growth mindset by specifically addressing the role of context in the relationship between mindset and academic achievement. Introducing context (i.e. migration background and academic validation) helps us identify *when* and for *whom* mindset intervention have optimal effects, allowing for a more detailed analysis of their potential impact (Walton, 2014). The study aims to better understand the mediating effects of mindset between first, behavioural factors such as students' academic engagement and their level of academic success; and second, contextual factors such as ethnic minority or migration background (relating to social context) and academic validation (relating to

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university context). Research has shown that academic validation, or the level of experienced student-centeredness, is an important contextual factor for increasing the sense of belonging and retention rate of minority students (Hurtado, 2013; Rendell, 2002).

Applying the Self-system Model of Motivational Development (Ryan & Deci, 2000; Skinner, et al. , 2008), this article offers a framework for analysing mindset and its potential impact on academic achievement while controlling for elements of educational context (i.e. migration background and academic validation). We first present a detailed overview of this model before formulating our research questions.

### **Theoretical framework**

The Self-System Model of Motivational Development or SSMMD (Ryan & Deci, 2000; Skinner, et al., 2008) is a theoretical framework that subdivides the learning process into context (such as classroom features or school climate), self (such as self-perceptions), and action (such as academic engagement or disengagement) leading up to the subsequent outcomes (such as study success). The hypothesis of this model that is widely empirically tested posits that a supportive, student-centred context (school, faculty or class) improves students' psychological self-perceptions. In turn, these self-perceptions can increase learners' engagement with academic content and improve learners' academic outcomes (Skinner, et al., 2008; 2009). In the following paragraphs we will discuss each structural level (context, self and action) in more detail.

The first level of the SSMMD is 'context'. Studies on at-risk students in higher education have argued that 'academic validation' is a key context variable in improving the academic outcomes of ethnic minority students (e.g. Rendon, 1994; 2000; Hurtado, Cuellar & Guillermo-Wann, 2011; Hurtado, 2013). Rendon (2002) defines academic validation as the active involvement of faculty (both teaching and supporting staff) to foster the academic development of students.

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Teaching staff who are sincere in their attention to students' academic development should actively create learning opportunities, for example by providing meaningful feedback, interacting with individual students, and lowering thresholds for students' academic development (Hurtado, et al., 2011; Hurtado, et al., 2015). However, in higher educational institutes, minority and non-minority students experience academic validation differently (Cuellar & Guillermo-Wann 2011; Hurtado, 2013), as minority students often receive much less validation. Moreover, academic validation influences self-perception and academic engagement and has been shown to be an important mediator, increasing self-perceptions such as sense of belonging and sense of competence in at-risk learners (Barnett, 2010; Rendon, 2002; Hurtado, Ruiz Alvarado, and Guillermo-Wann, 2015), which in turn decreases attrition rates and increases academic integration and overall chances of academic success (Rendon, 1994; Walton & Cohen, 2007; Steele & Aronson, 2005).

The second level of SSMMD is about the 'self'. The point here is that certain self-perceptions can motivate students to put in greater efforts, be more academically engaged, or inversely to be less motivated and more disengaged. One important type of self-perception relating to one's general need for competence is the need to be able to grow in one's abilities (Eliot & Dweck, 2005). Mindset interventions, in fact, are directed towards cultivating the idea that one can grow in one's abilities. These interventions can successfully help students to deal with challenging academic situations, motivating them to persist as the learning curve gets steeper (Steele & Aronson, 2005).

While there is a positive relationship between academic achievements and students having a growth mindset as opposed to a fixed mindset, (Blackwell, Trezsniewski & Dweck, 2007; Yeager et al., 2014), it has been shown that these mindsets typically manifest only when students encounter adversity or challenging situations (Walton, 2014). As such, most claims about the effectiveness of growth mindset interventions for at-risk students have been done in

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experimental or quasi-experimental conditions (e.g. Yeager, et al., 2016), and have not sufficiently taken into account the ways in which different contexts (e.g. minority or migration background, or academic validation) might present different challenges, creating a need for specific approaches and interventions adapted to the issues at hand (Walton, 2014).

Recently, researchers have administered more interventions and tests on a broad scale to see which groups benefit most from such interventions and what the most effective forms of large-scale intervention might be (Paunesku et al., 2015, 2016; Yeager et al., 2014; Claro, Paunesku, Dweck, 2016). In a study based in Chile, Claro et. al. (2016) found two things: first, the level of growth mindset predicts achievement; but furthermore, when controlling for socio-economic factors (i.e. family income), students with a low or lower socio-economic background are more likely to have a fixed mindset. It appears that the relationship between academic mindset and academic results depends on a number of factors that have not yet been adequately researched. Previous studies have indicated that growth mindsets and fixed mindsets among students correlate with diverse contextual factors, showing a need for different academic strategies to overcome (or avoid) contextual barriers (Claro, et al., 2016; Burnette, et al., 2013), and in turn, different educational outcomes.

On the third level of the SSMMD, these academic strategies or modes of engagement are categorized as ‘action’. Academic engagement is not just defined as overt study behaviour (Jimerson, Campos & Greif, 2003), but rather includes cognitive and emotional engagement, the students’ intellectual and motivational contribution in attempting to achieve specific learning goals (Hattie & Yates, 2014). Academic engagement is considered the strongest predictor for academic outcomes (Skinner, et al., 2008); in primary and secondary education it is often used as an indicator of learning success (cf. Skinner, et al., 2008; 2009). We operationalize academic engagement as ‘academic adjustment’ (Baker & Syrik, 1989; Goossens & Beyers, 2002), as it describes how learners adjust to the educational demands of



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university education, both on a behavioural and a cognitive level. As with academic engagement, academic adjustment is likewise influenced by a number of self-perception variables and contextual factors (e.g. Napoli and Wortman, 1998; Montgomery and Haemmerlie, 1993). For instance, psychological factors or self-perceptions such as anxiety, loneliness or social avoidance have been shown to interfere with adjustment to the academic context. Conversely, measures of positive psychological adjustment or self-perception such as positive affect, a positive social self-concept or self-esteem have been shown to foster better academic adjustment (Baker and Siryk, 1989).

### **Research Questions**

As described above, the Self-System Model of Motivational Development relates context, self and action to academic outcome. In doing so, it offers a framework for understanding how academic and social contexts can influence mindsets and in turn, how they can affect academic engagement and academic results. Our research question draws on this framework to bring together two lines of research.

While some previous studies (e.g. Claro, et al., 2016) suggest a relationship between mindset and contextual factors, introducing mindset into a structural model allows us to see how it can mediate between contextual at-risk features (minority status), elements of academic contexts (academic validation), academic adjustment, and ultimately academic outcome. Understanding this interplay between students' self-perceptions and their contextual embeddedness would help us advance how and for which students mindset interventions can best take place, as it underlines the fact that academic outcome does not solely depend on where a student is located on the mindset spectrum. This leads to the following research question: *'In what way does growth mindset mediate the negative effects of minority status on study success/academic outcome?'*

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A second line of research focuses on the validating aspects of academic educational context (i.e. academic validation) in terms of validity theory (Rendon, 1994). As academic validation facilitates integration for minority students in academic contexts, a higher degree of experienced academic validation might, in turn, increase academic adjustment and growth mindset – possibly decreasing the need for an intervention. This leads to the following research question: *‘Does academic validation alter self-perceived mindset and its impact on study success, academic outcomes, and academic engagement?’*

Based on these two approaches and the subsequent research questions formulated for each, we hypothesized that (1) growth mindset mediates the negative effects of minority status on academic outcome and that (2) academic validation significantly improves mindset and its impact on study success, academic outcome and academic engagement.

### **Methods**

#### **Participants and Design**

Although most (mindset) intervention studies take place in North American settings (e.g. US colleges) where minority students are often African American or Hispanic American (cf. Dweck, 2015), we will examine our research question in a European higher educational setting, in a case study on Flemish higher education. Here, minority students often come from a second or third generation non-Western European or non-Northern European background. Research shows that like African American students in US higher education, these students experience an achievement gap (cf. Aronson & Steele, 2005; Nouwen & Clycq, 2015; Timmerman, et al., 2016).

In order to obtain a representative sample of students, including minority students, a survey was sent to all students in a mid-sized Flemish university in Belgium. To increase the sample, surveys were distributed during classes in most academic programs for undergraduates.

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Participants were asked to fill in their enrolment number, allowing us to link the survey results to students' personal data and academic results in order to understand the mediated effect of academic validation, mindset and academic adjustment on study success. 1,549 students included their enrolment number in the survey of which more female students participated (n= 987, 63,7%), than male ones (n= 559, 36,1%) (missing values, n=2).

We surveyed nine faculties (May 2016) including Science (86, n=5,6%), Applied Science (281, n=18,1%), Life Sciences (149, n=9,6%), Humanities (173, n=11,2%), Design Science (54, n= 3,5%), Law (237, n= 15,3%), Social Sciences (162, n= 10,5%), Applied Economics (300, n= 19,4%), Applied Engineering (65, n= 4,2%), Interdisciplinary Centers (12, n= 0,8%) and missing (n= 30, 1,9%).

Minority students made up about one fifth of the sample (n=313, 20,2%). For the purposes of this study, we categorized students as 'minority' when they met the following four criteria: 1) they had at least one parent or two grandparents from a non-Western European or non-Northern European nation; 2) they had a different home language than the instructional language (Dutch); 3) their main residence was in Belgium (to avoid confusion with international students); and finally, 4) their secondary degree was obtained in Belgium (also to avoid confusion between 'international' and 'minority' students). Using prior data from the same academic institution (Lens, et al., 2015; Nouwen & Clycq, 2015) we know that, even when controlling for gender and prior education trajectories, these students on average score 20% less in terms of study success. The survey took place in the second semester, one month before final exams. As such, freshman participants were assumed to have experienced academic validating actions from staff before participating in the survey.

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### **Instruments**

#### *Independent variables*

*Growth and Fixed Mindset.* The survey research entailed six questions on a five-point Likert scale drawn from the work of Dweck (2000). Answers from the fixed mindset questions (e.g. “intelligence is something that cannot be changed very much” and “you can learn new things, but you can’t change a person’s intelligence”) and growth mindset were recalculated to fit a scale, whereby 1 indicates a tendency towards having a fixed mindset and 5 indicates a growth mindset. We obtained a good reliability score of .856 and performed a missing value analysis, a Little (1988) MCAR test, which measures whether or not the missing values are random, and found a non-significant  $\chi^2 = 34.29$  (46), ns. These results make it clear that missing values are at random. A multiple imputation algorithm was also used to estimate the missing values.

*Academic adjustment.* To measure academic adjustment, we used the SACQ (Baker & Syrik, 1989; Beyers & Goossens, 2002; Rienties, Beausaert & Grohnert, 2012), which uses 10 questions to measure students’ success in coping with various educational demands such as motivation, application or performance in the academic environment (e.g., “I’m not working as hard as I should on my coursework”; “I’m attending classes regularly”). When construct validity and reliability was tested in a Flemish university (Beyers & Goossens, 2002), the study showed a valid and reliable measure. Likewise, our results indicate a strong Cronbach alpha of .838. Missing value analyses via the Little (1988) MCAR test give a non-significant  $\chi^2 = 108.46$  (111), ns. Missing values have been estimated using the multiple imputation procedure. A high score indicates a strong academic adjustment.

*Academic validation.* This scale includes five items enquiring about how strongly learners feel validated by teaching staff, i.e. how professors and teaching staff offer students feedback and appreciation for their active participation in class (Hurtado, 2013). Items included questions such as: “Instructors provided me with feedback that helped me judge my progress”. The scale

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has a Cronbach alpha score of .815. Little (1988) MCAR test gives a  $\chi^2 = 26.98 (31)$ , ns., allowing us to estimate missing values using the multiple imputation procedure.

### *Dependent variable*

Academic outcome was measured by dividing ECTS (European Credits Transfer and Accumulation System) credits from successfully passed courses by the credits of all courses in a student's curriculum, which results in a score from 0 to 1. This academic outcome measure was taken as a score lower than .6 is the benchmark to be refused readmission to the university, and as such, a drop-out indicator.

## **Results**

Table 1 presents the descriptive statistics for all variables. Although students with and students without a minority background are not significantly different in terms of academic adjustment, the dependent variable — academic outcome — differs significantly between the two groups. Here, on average, minority students score over 20% less than students without a minority background. Even after controlling for gender, prior education and first year (freshman) status,  $F(4, 1403) = 183.9, p < .001$ , partial  $\eta^2 = .12$ , this difference remains significant.

Furthermore, Table 1 indicates that there is no significant difference between minority and majority students for academic adjustment. Mindset differs significantly, although contrary to our expectations, minority students appear to have a higher score on the mindset scale than majority students. Furthermore, mindset correlates positively with academic adjustment, but only significantly for majority students; and, contrary to theoretical assumptions, it correlates negatively with academic outcome. Conversely, academic validation correlates positively with academic outcome and adjustment, conforming the theoretical assumptions of those variables.

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Table 1.

*Descriptive statistics, including N, Mean, SD. T-test differences between majority and minority students. Correlations between measures.*

Variables	Descriptive Statistics			t-test		Correlations		
	n	M	SD	t	df	AA	M	AV
Academic outcome	1418	.80	0.27			.273**	-.105**	.144**
Academic outcome majority	1142	.84	0.27	10.9**	381	.282**	-.068*	.150**
Academic outcome minority	293	.61	0.32			.274**	-.070*	.111
Academic adjustment	1549	3.2	0.61			.183**		.335**
AA majority	1236	3.27	0.61	1.21	1547	.222**		.343**
AA minority	313	3.22	0.61			.067		.298**
Mindset	1549	3.46	0.63					.059*
M majority	1236	3.41	0.62	-5.38**	1547			.083**
M minority	313	3.62	0.64					.006
Academic validation	1549	2.84	0.70					
AV majority	1236	2.86	0.70	2.08*	1547			
AV minority	313	2.76	0.69					

Note: AO= Academic outcome, AA= Academic Adjustment, M= Mindset, AV= Academic validation; \*\*=  $p < .001$ , \*=  $p < .05$ ; t= t-test (difference minority majority), df= degrees of freedom of the t-test.

Our research questions aim at determining direct and indirect effects of contextual variables on growth mindset, academic validation, academic adjustment and academic outcome. We use structural equation modelling, which indicates both direct effects (of the independent variable on the dependent) and total effects (which includes indirect effects; Bollen, 1987). Figure 1 shows the path model, which has a  $\chi^2(1) = 4.6$ ,  $p = .032$ . RMSEA = .048, CFI = .994 and NFI = .992, indicating that the data adequately fit the model (Ho, 2004). Squared multiple correlations indicates a  $r^2$  value of .19, meaning the model explains 19% of the variance of academic outcome.

Confirming our results in table 1 and in line with the literature review, we find, as shown in Table 2 and Figure 1, that minority students have a significantly lower chance of achieving the same level of academic outcome. Additionally, the data show that academic adjustment is an important predictor of academic outcome. A singular non-significant correlation is found

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between minority status and academic adjustment. A t-test (table 1) shows that results between the two groups do not differ for that variable, indicating that both groups appear to have the same level of academic engagement, despite the absence of final academic results in the analysis.

Table 2.

*Standardized and unstandardized regression weights of variables shown in figure 1.*

Variables	Independent	Regression weights			
		Standardized	Unstandardized	S.E.	p
Academic Validation	Minority	<u>-.053</u>	-.093	.044	.037
Mindset	Minority	.139	.219	.040	***
Mindset	Academic Validation	.066	.060	.023	.008
Academic Adjustment	Mindset	.169	.165	.023	***
Academic Adjustment	Minority	<u>-.037</u>	-.056	.037	.123
Academic Adjustment	Academic Validation	.323	.283	.021	***
Academic outcome	Minority	<u>-.298</u>	-.205	.017	***
Academic outcome	Mindset	<u>-.123</u>	-.054	.011	***
Academic outcome	Academic Adjustment	.284	.128	.011	***

Note: \*\*\*= p<.001; S.E.: standard error

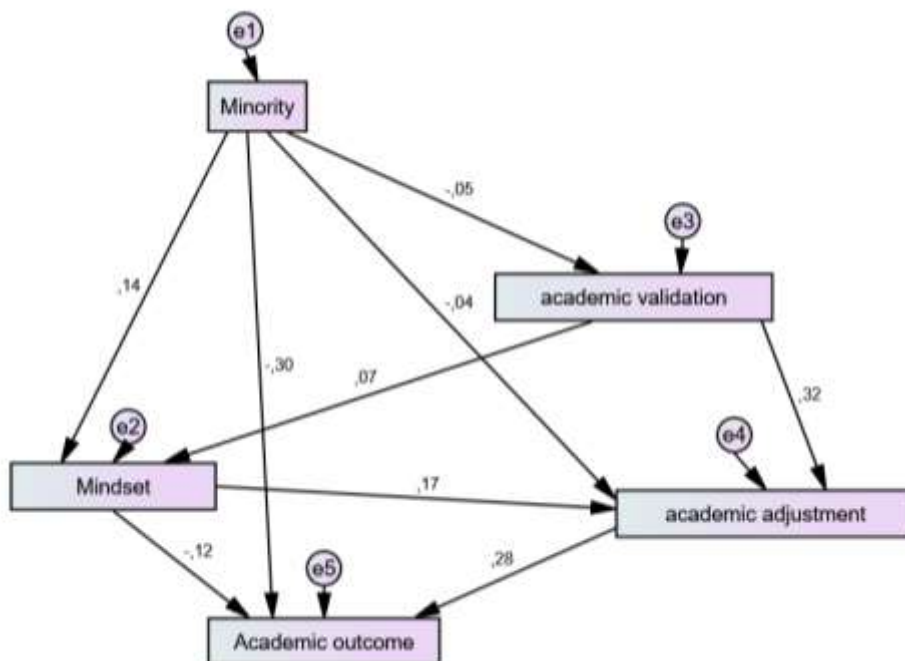


Figure 1. Path-model with direct effects shown as standardized regression weights. Underlined variable is non-significant and 'eNUMBER' values are error estimates.

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Furthermore, the data reveal a negative effect of growth mindset on academic outcome, despite a positive effect on academic engagement. This means that having a growth mindset contributes to a lower academic result, even though it does seem to be correlated with study effort (academic adjustment). Presumably, this effect is enhanced by the fact that minority students appear to have a significantly higher growth mindset than their non-minority counterparts. Nonetheless, these results refute our hypothesis that mindset would have a mediating function between contextual elements, such as minority status or academic validation, and academic adjustment (action). To better understand this direct effect, in Table 3 we present the standardized total and standardized indirect effects.

The total effect of minority status on academic outcome is higher than its direct effect (see Table 2), indicating that the negative effects are mediated — albeit in a negative way — by growth mindset. Academic validation enhances academic adjustment as well as academic outcome. Nonetheless, we see that academic validation is slightly enhanced by mindset (table 3), which conforms to the theory that self-perception does indeed have a mediating effect. However, the  $\beta$  is only .011, indicating the effect is negligible.

Table 3.

*Total and indirect standardized effects of dependent variables on independent variables.*

	Minority		Academic Validation		Mindset		Academic Adjustment	
	Total	Indirect	Total	Indirect	Total	Indirect	Total	Indirect
Academic Validation	-.053							
Mindset	.136	-.004	.066					
Academic Adjustment	-.031	.006	.334	.011	.169			
Academic outcome	-.323	-.025	.087	.087	-.074	.048	.284	

Anonymized data has been added as supplementary material.



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### Discussion

Our main research questions were: ‘In what way does growth mindset mediate the negative effects of minority status on study success/academic outcome?’ and ‘Does academic validation alter self-perceived mindset and its impact on study success, academic outcome, and academic engagement?’ These aim at understanding the mediating function of growth mindset between the contextual factors of ‘minority background’ and ‘academic validation’, and the level of academic adjustment and academic outcome. Our analysis indicates an inverse, negative effect of mindset on academic outcomes, with little impact of context on mindset. As our analysis shows, our first hypothesis can be disconfirmed as in this sample growth mindset does not seem to mediate the negative effects of minority status on academic outcome. The second postulated hypothesis can be confirmed as academic validation is shown to slightly alter mindset and have a positive impact on study success, i.e. academic outcome, and academic engagement. Although having a higher growth mindset does positively stimulate academic adjustment, such as by showcasing cognitive and motivational behaviour required for academic success, the total effect remains negative, indicating that the effect on adjustment is negligible. These findings contradict a large body of literature on growth mindset which supports the generally positive correlation between growth mindset and academic outcome. Nevertheless, a few studies (such as Bhanik & Vranka, 2017) do confirm that in some situations, a fixed rather than a growth mindset positively predicts outcome.

There are several possible explanations for these findings. First, the mediating effects of contextual variables can obscure the effect of growth mindset. Introducing growth mindset into a model in which contextual variables such as minority background and academic validation are also included could counteract the expected potential impact of growth mindset on academic engagement and outcome. As Hochanadel & Finnamore (2015) as well as Walton (2014) have indicated, being exposed to a challenging situation can be a necessary factor for

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eliciting the potentially advantageous effects of growth mindset. This so called 'being in the face of adversity' (Walton, 2014) thus refers to the specific path the student has or has not already gone through throughout the academic year. In other words, growth mindset, when measured at different periods in the academic year, can show a different effect on academic outcome depending on whether students have experienced challenging situations previously. Including 'time' as a variable in future research could fine-tune the understanding of growth mindset and its potential effects still (cf. Banik & Vranka, 2017 for a similar analysis).

Secondly, measurement variance could be invoked to explain why students with different cultural backgrounds have different understandings of key concepts related to growth mindset in the survey. A study at a Czech university (Banik & Vranka, 2017) did find similar results (i.e. a negative association between growth mindset and students' final results), which might indicate that the survey questions may need to be reformulated to account for cultural differences in certain European educational contexts. However, more research integrating mindset and contextual variables is necessary to confirm or disprove the hypothesis.

A third possible explanation for these counterintuitive findings is the fact that specific groups of students (i.e. students with a minority background) simply overestimate their academic performances (e.g., Connor, et al., 2004; Ehrlinger, Mitchum & Dweck, 2016), or that they have to work harder as a result of existing contextual barriers, meaning they would need a higher growth mindset in order to be as academically successful as majority students. After all, those students who are studying at the University have already shown that they can be successful at the secondary school level. And as students from a minority background usually face greater obstacles in their school trajectory, the very fact that they are at university might bolster their self-worth. Their overestimation (due to their self-worth) is sometimes used as an indication of lacking metacognitive skills, necessary to succeed (cf. Dunning-Kruger-effect, Dunning, 2011).

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One possible limitation of our research is the method, i.e., survey research, which is sometimes prone to a selection bias in educational settings (e.g., Anderman, et al., 1995). Performing our survey late in the academic year, a month before the final yearly exams, might have selected for students with a higher growth mindset, as minority students with a fixed mindset might have dropped out in an earlier stage of the academic year. Consequently, the gender imbalance – more female students participated in the survey compared to the actual proportion of female students at the institution – can be an indication of this selection bias and, as such, an issue which further research can improve.

In this study we have chosen to focus on the exemplary contextual factors of ‘migration background’ and ‘academic validation’. Future studies could expand the scope of research on the contextual considerations which may influence a student’s path to academic engagement. However, based on these results, we do suggest that mindset interventions should be preceded by a careful survey indicating whether a student or a group of students truly *needs* such an intervention at that specific moment to improve their study success.

We do find a positive effect of academic validation on academic adjustment and also, through indirect measures (see table 3), on academic outcome. Minority students experience this validation much less than majority students, so it seems reasonable to conclude that contextual interventions will be more effective in this case than mindset interventions.

These results do not necessarily disprove the advantageous effects of mindset interventions. Rather, our analysis opens the door for a more detailed attempt at optimizing their potential impact. Adhering to a growth or fixed mindset alone does not fully account for academic outcomes. Processes on the level of the self — such as learning strategies, theories of intelligence, and self-perceptions — can be considered alongside contextual factors in order to gain a clear understanding of which kind of interventions are successful. However, it is only

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when including broader contextual factors that evaluations can make sense, and move away from the experimental to provide value in realistic educational settings.

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