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The directional links between students' academic motivation and social integration during the first year of higher education

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Abstract

Previous theoretical research proposed a link between students' academic motivation and students' experiences of social integration, but less is known empirically about this association in higher education contexts. In order to explore the directional links between students' academic motivation and social integration, this survey study aims to investigate : 1) how students' motivation at the start affects their experiences of social integration at the end of the first year of higher education and 2) how students' social integration at the start influences their motivation at the end of the first year. A total of 930 freshmen participated in this study by completing a questionnaire. Three autoregressive cross-lagged models were tested by using a longitudinal dataset with two measurement waves, at the start and at the end of the first year of higher education. The results showed that students with a high level of amotivation at the start of the first year of higher education were less socially integrated at the end of the first year. Furthermore, social integration could play a crucial role in positively changing students' identified regulation during the first year of higher education. Students who experienced a greater degree of social integration at the start of the first year, had a higher score on identified regulation at the end of the first year. These results highlight the importance of creating a learning environment which fosters students' social integration, as well as supporting less motivated students at the start of the first year.

Keywords: Academic motivation; Social integration; Higher education; First-year students; Involvement; Self-determination

Introduction

In recent years, an increasing number of students are making the transition from secondary to higher education (Gale & Parker, 2012; OECD, 2013). This is especially the case in countries with open access and no selection procedures to enter the first year of higher education (van der Wende, 2003). It implies that a more diverse group of students are entering higher education, as they have followed a diverse preparatory study route and have different motives for studying. Consequently, the diversity in student backgrounds poses many new challenges for higher education institutes, such as how to deal with the shock of transition that students can experience and how to cope with differences between students in their preparedness for higher education, motives for studying and expectations (Briggs, Clark, & Hall, 2012; Gale & Parker, 2012; Jenert, Brahm, Gommers, & Kühner, 2017; Kyndt, Donche, Trigwell, & Lindblom-Ylänne, 2017).

Although many students successfully make the transition to higher education, others experience difficulties in adjusting to the social and academic requirements of the new environment (Bosse & Trautwein, 2014; Kember, 2001). First-year students often have emotional feelings of ambivalence, loss and disconnection to the university context (Christie, Tett, Cree, Hounsell, & McCune, 2008; Perry & Allard, 2003). Internationally, a large number of university students experience high levels of psychological distress and mental health problems (Eisenberg, Hunt, & Speer, 2013; Larcombe et al., 2016). Therefore, it is important to gain a better understanding of the crucial factors that promote positive academic adjustment and how these factors longitudinally interact with each other during the first year of higher education.

Two factors that can contribute to a better academic fit at this stage are building peer relationships (Wilson et al., 2014) and students' academic motivation (Dennis, Phinney, & Chuateco, 2005; Donche, Coertjens, van Daal, De Maeyer, & Van Petegem, 2014). Several empirical studies have demonstrated the importance of fostering students' academic motivation and their social integration process in the first year of higher education (Braxton, Jones, Hirschy, & Hartley III, 2008; Próspero & Vohra-Gupta, 2007; Tinto, 2012; Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009). Moreover, previous studies have emphasised a theoretical link between students' motivation and students' feelings of social integration or involvement (Appleton, Christenson, & Furlong, 2008; Niemiec & Ryan, 2009;

Urduan & Schoenfelder, 2006; Wentzel, 2005). In particular, these studies have pointed out the importance of the role of students' social connections with fellow students in satisfying their feelings of relatedness and in affecting their academic motivation. Peer group relationships can enhance students' feelings of relatedness or sense of belonging (Baumeister & Leary, 1995; Meeuwisse, Severiens, & Born, 2010; Wigfield & Eccles, 2002), which in turn can influence students' motives to engage in learning activities.

Although prior research suggested a theoretical link between students' academic motivation and experiences of social integration, only a few studies have empirically investigated this interplay in the higher education context (Freeman, Anderman, & Jensen, 2007; Próspero & Vohra-Gupta, 2007; Rienties, Tempelaar, Van den Bossche, Gijsselaers, & Segers, 2009). However, the more recent studies mainly investigated these concepts by using a cross-sectional research design, whereby only correlational conclusions can be drawn. The present study aims to examine the longitudinal directional effects between students' academic motivation and social integration during the first year of higher education. Longitudinal research is needed to provide a comprehensive view of the possible reciprocal relationship between academic motivation and social integration in the first year of higher education.

Academic motivation

Students can differ greatly in the reasons or motives for learning in higher education. For example, they may seek high grades, have a spontaneous interest in the learning content or aims to achieve future professional goals. A commonly used theory to describe different motivation types is the self-determination theory (SDT) (Deci & Ryan, 2000; Deci & Ryan, 2008b; Vansteenkiste & Ryan, 2013). Regarding the quality of motivation, SDT makes an important distinction between autonomous motivation and controlled motivation (Vansteenkiste, Lens, & Deci, 2006).

Autonomous motivation, which involves the experience of volition and choice, consists of two sub-types: intrinsic motivation and identified regulation (Vansteenkiste et al., 2006; Vansteenkiste et al., 2009). Intrinsic motivation refers to the enactment of the activity out of interest and enjoyment (Deci & Ryan, 2002). It represents students' engagement in an activity for its own sake (Vansteenkiste et al., 2006). Students who are intrinsically motivated, for instance, learn because of curiosity and personal

interest in the learning material (Vansteenkiste et al., 2009). When students study because of its personal relevance in order to achieve a personal goal, it is referred to as identified regulation (Vansteenkiste et al., 2006; Vansteenkiste et al., 2009).

Controlled motivation also consists of two types: introjected and external regulation. In this case, behaviour is mainly driven by feelings of pressure (Deci & Ryan, 2000). First-year students who study because of internal pressure have more introjected motives for studying. They study in order to attain feelings of high self-worth and pride or to avoid feelings of guilt, low self-worth, shame or anxiety (Assor, Vansteenkiste, & Kaplan, 2009). When externally regulated, students learn because of external pressure, such as avoiding a punishment, obtaining rewards or to meet external expectations (Ryan & Deci, 2000; Vansteenkiste et al., 2009). For instance, students who learn primarily because they know their parents will reward them for doing well are externally regulated (Vansteenkiste et al., 2006).

In addition to the quality of motivation, SDT research has also focused on the quantity of motivation, in terms of amotivation. Students who are amotivated do not study or study without an intention and lack regulation in learning (Donche, De Maeyer, Coertjens, van Daal, & Van Petegem, 2013; Ryan & Deci, 2000). They experience feelings of incompetence and have little concern for their studies (Vallerand et al., 1992; Vanthournout, Gijbels, Coertjens, Donche, & Van Petegem, 2012).

Previous research has shown that students' motivation is not a stable trait, as it can change over time and across different learning environments. Evidence was found that students' motivation changes across and after the transition from secondary to higher education (Kyndt et al., 2015; Pan & Gauvain, 2012). The results of the study of Kyndt et al. (2015) revealed that students' autonomous motivation increased across the transition and that their amotivation score was lower at the start of the first year of higher education than at the end of secondary education, which then remained stable within higher education. Factors situated within the academic and social environment of higher education are crucial to understand this development of students' motivation. This study further builds on this line of research by examining the role of students' social integration process in promoting their academic motivation during the first year of higher education.

Students' social integration process

Students' process of social integration is a well-investigated topic within the higher education literature (Bean & Metzner, 1985; Neuville et al., 2007; Pascarella & Terenzini, 1980; Severiens & Wolff, 2008; Spady, 1970; Tinto, 1997). According to Tinto's model of student departure (1975, 1993) or student persistence (1997), students' social integration or involvement refers to the interactions between the student and the social system of their college or university, and can affect student learning and student persistence in the first year of higher education.

As noticed by Beekhoven, De Jong, and Van Hout (2002), the diversity of indicators for students' social integration is large. For instance, Tinto (1975) posits that informal peer group associations, extracurricular activities and interaction with faculty and administrative personnel are mechanisms for social integration. In more recent studies, it is apparent that social integration has been conceptualised as students' contacts with fellow students, while the contact with academic staff was measured to investigate students' academic integration (Neuville et al., 2007; Richardson, Abraham, & Bond, 2012; Severiens & Wolff, 2008). To explore students' social integration process, the current study aims to follow this trend by capturing students' experiences of their interactions with fellow students (Beekhoven et al., 2002).

In the higher education literature, students' social integration has also been labelled in terms of social involvement (Neuville et al., 2007; Robbins et al., 2004; Tinto, 1997). This latter term can be linked to the motivation literature, where the role of student involvement is used to refer to strategies for enhancing feelings of relatedness (Niemic & Ryan, 2009; Wigfield & Eccles, 2002).

The need for relatedness concerns the desire to feel connected to others and to experience love and care by others (Baumeister & Leary, 1995; Deci & Ryan, 2000). The social environment can play an important role in promoting students' autonomous motivation by satisfying this basic psychological need (Deci & Ryan, 2000; Deci & Ryan, 2008a; Niemic & Ryan, 2009). Enhancing students' need for relatedness facilitates the process of internalisation of academic motivation (Niemic & Ryan, 2009). Or, in other words, students tend to be more intrinsically motivated and more willing to engage in less interesting tasks, in educational contexts that support satisfaction of relatedness. Strategies for enhancing relatedness have been described as the role of involvement and include conveying warmth, caring and respect to students (Niemic & Ryan, 2009; Sierens, 2010).

Prior SDT studies mostly investigated the role of involvement by capturing students' perceptions of teaching support and behaviours (Sierens, 2010). However, in addition to the teacher-student relationship, students' social connections with fellow students may be instrumental in helping them feel a sense of relatedness and in affecting students' academic motivation and participatory behaviours in the first year of higher education (Appleton et al., 2008). Friends can provide direct emotional support as well as buffering support in stressful situations (Wilcox, Winn, & Fyvie-Gauld, 2005). Building new friendships is important to help students adjust to the new academic and social environment in the first year of higher education (Buote et al., 2007). Friends can provide a sense of belonging, offer advice and are a source of fun and enjoyment. This latter can counteract the many stressors students experience in adjusting to university life.

Only a small number of researchers found evidence that there is a relationship between students' academic motivation and students' feelings of social integration or involvement in the higher education context (Freeman et al., 2007; Próspero & Vohra-Gupta, 2007; Rienties et al., 2009). For instance, in the context of first-generation students, the study by Próspero and Vohra-Gupta (2007) showed that students with greater experiences of social integration are more intrinsically motivated, more extrinsically motivated and less amotivated. The research of Freeman et al. (2007) also indicated a positive association between intrinsic motivation and a sense of belonging to peers.

The present study

Previous research shows that students' academic motivation and their interactions with fellow students are crucial for a positive academic adjustment to the new environment in the first year of higher education. However, it is important to gain a further understanding of how these factors interact with each other. Although some former studies have investigated the relationships between academic motivation and social integration (Freeman et al., 2007; Próspero & Vohra-Gupta, 2007), only cross-sectional results are available, which do not enable conclusions to be drawn on the directional effects between these constructs under study. Therefore, this survey study focusses on the role of students' academic motivation in explaining changes in students' experiences of social integration during the first year of higher education, as well as on the role of students' social integration in explaining changes in

students' academic motivation. Based on the literature, the following conceptual model will be used as a baseline for this study (Figure 1).

[Insert Figure 1 about here]

Our first research question (RQ1) concerns the investigation of how students' motivation at the start (T1) influences their experiences of social integration at the end of their first year of higher education (T2), after controlling for the starting score on social integration (T1) (see also Figure 1). We expect a longitudinal effect, as initial evidence indicated that students take another position within the social network, depending on their initial score on the academic motivation scale (Rienties et al., 2009). Highly intrinsically motivated learners have more connections with other students and seem to become more central and prominent contributors to cognitive discourses, while more extrinsically motivated students contribute less and are positioned throughout the social network (Rienties et al., 2009).

The second research question (RQ2) aims to investigate how students' social integration at the start (T1) influences academic motivation at the end of the first year of higher education (T2), after controlling for the starting score on academic motivation (T1) (see also Figure 1). Theoretically, based on the self-determination theory, we hypothesise that social integration has an effect on academic motivation, as the provision of peer involvement can foster students to develop towards more autonomous forms of regulation. When students' basic psychological needs for relatedness are supported in the learning environment, they are more likely to internalise their motivation to learn and to be more autonomously engaged in their studies (Connell & Wellborn, 1991; Niemiec & Ryan, 2009).

When investigating the longitudinal directional links between social integration and motivation, it is relevant to control for gender, as there is evidence of a difference in experiences of social integration between male and female students (Tinajero, Martínez-López, Rodríguez, Guisande, & Páramo, 2015). Female students appeared to experience higher levels of social support and satisfaction with the support than male students.

Method

Design and Participants

A sample of 930 first-year bachelor students attending higher education in Flanders (Dutch speaking part of Belgium) was used. All students had just made the transition from secondary education to higher education. At the start of the first year of higher education, the average age of the students was 18.22 years ($SD = 0.55$). More female freshmen (60%) were included than males (40%), which was comparable to the population data of first-year students from Flanders (Flemish Government, 2012). The students had followed different prior education tracks in secondary school: 71% followed an academic education track, 2% an artistic education track and 27% a technical education track.

A repeated measurement design comprising of two waves of data collection was used. During the first year of higher education, data were gathered at the start (Wave 1, $N = 638$) and at the end of the first year of higher education (Wave 2, $N = 656$). A total of 385 students (41%) participated in both measurement waves, while 545 students (59%) participated in one of these data collections. The group of students that participated in both waves ($N = 385$) were compared on the background variables gender and prior education with the group of students that participated in one wave ($N = 545$). Chi-square tests revealed no differences in prior education distribution ($\chi^2(2) = 1.495$; $p = 0.465$). Only a small significant difference was found between the samples of female students participating in one versus two waves, respectively 56% and 66% ($\chi^2(1) = 8.613$; $p = 0.03$).

In both measurement waves, students received an e-mail or letter with a short explanation of the survey and a personal link to the online questionnaire. After each wave two reminders were sent. An informed consent was signed by all students to confirm that they voluntarily participated in this study. The confidentiality of the results was guaranteed by the research team. According to Belgian Law of Experiments on Humans (7th May 2004), ethics approval was not needed for the current research, as this study was not an experiment related to the development of knowledge regarding to the performance of health professions.

Instruments

In the following sections, the instruments will be described. An overview of all the scales is presented in Table 1.

Academic motivation. Students' academic motivation was measured at the start (T1) and at the end of the first year of higher education (T2). Autonomous and controlled motivation were assessed with a shortened Dutch version of the academic self-regulation questionnaire (SRQ-A) and the academic motivation scale (AMS) (Donche & Van Petegem, 2008; Ryan & Connell, 1989; Vallerand et al., 1992; Vansteenkiste et al., 2009). All items were scored on a five-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Social integration. Students' social integration was investigated by capturing students' experiences of their interactions with fellow students at the start (T1) and at the end of the first year of higher education (T2). This was measured by using the contact-scale, which contained six items (Beekhoven et al., 2002). Items were scored on a seven-point Likert scale, ranging from 1 (*definitely not agree*) to 7 (*fully agree*).

Gender was included as a control variable, coded as 1 if female student.

[Insert Table 1 about here]

Analysis

As a first preparatory step, longitudinal measurement invariance was tested for each scale, by estimating and comparing the following three models: 1) the baseline model and the invariant factor loading model; and 2) the invariant factor loading model and the invariant intercept model (Coertjens, Donche, De Maeyer, Vanthournout, & Van Petegem, 2012). A decrease in CFI of less than 0.01 between the models and a probability lower than 0.05 for the chi-square difference test ($\Delta\chi^2$), indicates that the measurement can be assumed as equivalent over time (Byrne, 2010; Cheung & Rensvold, 2002; Coertjens et al., 2012; Vandenberg & Lance, 2000). The results are presented in the Appendix and indicate that complete longitudinal measurement invariance can be assumed for all scales, as the factor loadings and intercepts are invariant across the two waves. For each model comparison, the CFI-difference was smaller than 0.01. Furthermore, for most scales, the difference in the chi-square test was not significant, which indicates that the invariance hypothesis should not be rejected. Although the difference in the chi-square test of two model comparisons was significant for the scales intrinsic

motivation and amotivation, the difference in CFI of these model comparisons appeared to be smaller than 0.01. Therefore, we can conclude that 1) all scales, including also the intrinsic motivation scale and the amotivation scale, measure equivalently over time and that 2) all items of the measured scales were retained in the next analyses.

Secondly, to gain more insight into the direction of effects between academic motivation and social integration, three autoregressive cross-lagged models were tested by using a structural equation modelling (SEM) approach with latent variables (Bollen & Curran, 2006; Selig & Little, 2012). These models examined the directional links across time between 1) autonomous motivation and social integration; 2) controlled motivation and social integration; and 3) amotivation and social integration. Gender was added as a controlling effect of the latent variables, both at Time 1 and Time 2. The fit of each model was assessed using the Comparative Fit Index (*CFI*), the Tucker–Lewis Index (*TLI*), the Root Mean Squared Error of Approximation (*RMSEA*) and the Standardized Root Mean Square Residual (*SRMR*). For CFI and TLI, values close to .95 indicate a well-fitting model and values greater than .90 indicate an adequate model fit (Byrne, 2010; Hu & Bentler, 1999). RMSEA values as high as .08 or less than .05 support, respectively, an acceptable and a good model fit (Browne & Cudeck, 1992). For SRMR, a cut-off value close to 0.08 indicates a well-fitting model (Hu & Bentler, 1999). All significant correlations and effects ($p < .05$) of the tested model are presented in the figures of the results section.

All analyses were performed with M plus version 7.1 (Muthén & Muthén, 1998–2012), using the maximum likelihood estimator with robust standard errors (MLR). This method is robust to non-normality and allows management of missing data responses by using all the data. More specifically, for each respondent, the computation of the log-likelihood is based on the available data, complete or incomplete (Coertjens, Donche, De Maeyer, Vanthournout, & Van Petegem, 2017).

Results

To examine the directional links between academic motivation and social integration (RQ1 and RQ2), we tested three different SEM models: model 1) autonomous motivation and social integration; model 2) controlled motivation and social integration; and model 3) amotivation and social integration. The fit indices for each model are presented in Table 2.

[Insert Table 2 about here]

Directional links between the types of autonomous motivation (intrinsic motivation and identified regulation) and social integration

The significant associations of the estimated model for autonomous motivation and social integration (Model 1) are presented in Figure 2. This model fitted the data well ($CFI = 0.92$; $TLI = 0.91$; $RMSEA = 0.05$; $SRMR = 0.08$). Students' score on identified regulation at Time 1 was weakly positively related to students' experience of social integration ($r = 0.17$, $p < 0.01$). At Time 2, this correlation was also weakly positively significant ($r = 0.19$, $p < 0.05$). Therefore, the results show that students who are feeling more socially integrated also have a higher score on identified regulation, both at the start and at the end of the first year of higher education.

The cross-lagged effect of social integration at Time 1 on identified regulation at Time 2 was positively significant ($B = 0.15$, $p < 0.05$), after controlling for the score of identified regulation at the start (T1) and gender. Students who are more socially integrated at the start of the first year, have a higher score on identified regulation at the end of the first year of higher education. No other cross-lagged effects were found.

[Insert Figure 2 about here]

The results of the tested model indicated that 59% of the variance in scores on identified regulation at the end of the first year of higher education (T2) and 65% of the variance in scores on intrinsic motivation at the end of the first year (T2) could be explained by gender and scores on identified regulation, intrinsic motivation and social integration at the start of the first year (T1). Furthermore, 46% of the variance in scores on social integration at Time 2 could be explained by the same independent variables at Time 1.

Only the controlling effect of gender on intrinsic motivation at Time 1 ($B = 0.14$, $p < 0.001$) and the effect of gender on identified regulation at Time 1 ($B = 0.18$, $p < 0.001$) were significant. This means

that female students had a higher score on both types of autonomous motivation at the start of the first year of higher education, compared to the scores of male students.

Directional links between the types of controlled motivation (introjected and external regulation) and social integration

The estimated model of the relationship between controlled motivation and social integration (model 2) is presented in Figure 3. This resulting model fitted the data well ($CFI = 0.93$; $TLI = 0.92$; $RMSEA = 0.04$; $SRMR = 0.06$). As Figure 3 shows, students' experiences of social integration at Time 1 were negatively related to introjected regulation ($r = -0.14$, $p < 0.01$) and to external regulation ($r = -0.18$, $p < 0.001$). These relationships were not found at Time 2. The results indicate that students who are more socially integrated at the start of the first year of higher education (T1) are also less introjected or externally regulated. Alternatively, students who are more introjected or externally regulated are also less socially integrated. Furthermore, on both measurement waves, a moderate positive correlation was found between external and introjected regulation ($r_{T1} = 0.35$ and $r_{T2} = 0.33$). No significant cross-lagged effects were found.

[Insert Figure 3 about here]

The results of the tested model indicated that 58% of the variance in scores on introjected regulation at the end of the first year of higher education (T2) and 48% of the variance in scores on external regulation at the end of the first year (T2) could be explained by gender and scores on introjected regulation, external regulation and social integration at start of the first year (T1). Furthermore, 46% of the variance in scores on social integration at Time 2 could be explained by the same independent variables at Time 1.

Only the controlling effects of gender on introjected regulation motivation at Time 1 ($B = 0.09$; $p < 0.01$) and at Time 2 ($B = 0.06$; $p < 0.05$) were significant. Female students had a higher score on introjected regulation compared to male students at the start and at the end of the first year.

Directional links between amotivation and social integration

The estimated model of the relationship between amotivation and social integration (Model 3) is presented in Figure 4. This model fitted the data well ($CFI = 0.94$; $TLI = 0.93$; $RMSEA = 0.04$; $SRMR = 0.05$). Amotivation and students' experiences of social integration were negatively related at Time 1 and Time 2 ($r_{T1} = -0.23$ and $r_{T2} = -0.21$). This result suggests that students who are less amotivated to study are also feeling more socially integrated at the same measurement moment (T1 or T2). Or in other words, students who are more social integrated, are also less amotivated to study.

Moreover, a significant cross-lagged effect of amotivation (T1) on social integration (T2) was found ($B = -0.11$, $p < 0.05$), after controlling for gender and the experiences of social integration at T1. Students who are less amotivated to study at the start of the first year, experience a higher level of social integration at the end of the first year of higher education.

[Insert Figure 4 about here]

The results of the tested model revealed that 29% of the variance in scores on amotivation at the end of the first year of higher education (T2) and 47% of the variance in scores on social integration at the end of the first year (T2) could be explained by gender and scores on amotivation at the start of the first year (T1).

Additionally, we found one significant controlling effect of gender on amotivation at Time 1 ($B = -0.17$; $p < 0.001$). At the start of the first year of higher education, male students scored higher on the amotivation scale, compared to female students.

Conclusion and discussion

Although prior research proposed a theoretical link between students' academic motivation and students' feeling of social integration (Appleton et al., 2008; Niemiec & Ryan, 2009; Urdan & Schoenfelder, 2006; Wentzel, 2005), only a few researchers have empirically examined this association in the higher education context (Freeman et al., 2007; Próspero & Vohra-Gupta, 2007; Rienties et al., 2009). Moreover, most research was undertaken using cross-sectional research designs. Therefore, this

study aimed to explore the directional links between students' academic motivation and social integration longitudinally during the first year of higher education, by testing three autoregressive cross-lagged models and by taking into account each subtype of autonomous and controlled motivation.

The relationship between academic motivation and social integration

Concerning the relationship between academic motivation and social integration at the start (T1) or at the end (T2) of the first year of higher education, our results demonstrated that students' experiences of social integration are positively related to their academic motivation. First-year students who are more socially integrated are more identified regulated to study, have less controlled regulation and are less amotivated to study in higher education. Or, in other words, first-year students who experience their interactions with fellow students positively, have a better quality and quantity of motivation for studying and vice versa.

These findings confirm the cross-sectional results of Próspero and Vohra-Gupta (2007) and Freeman et al. (2007), which also showed that students with higher perceptions of social integration were more extrinsically motivated and less amotivated. However, our results give more in-depth information on the types of extrinsic motivation and on the period during the first year of higher education that really matters. It is clear that only identified regulation (as a type of extrinsic motivation) was found positively related to social integration, while the other types, introjected and external regulation, were found to be negatively correlated with students' social integration at the start of the first year of higher education. This latter relationship was not found at the end of the first year of higher education. In contrast to the results of the studies of Freeman et al. (2007) and Próspero and Vohra-Gupta (2007), we did not find a positive correlation between social integration and intrinsic motivation. An explanation for this could be that not all students study for sheer joy, passion and interest in the current context of open access to higher education. Some students are more motivated to study for personal relevance, in order to reach their future goals (Byrne & Flood, 2005).

The directional links between academic motivation and social integration across time

This study raises new insights into the directional links between academic motivation and social integration across the first year of higher education. More specifically, our results indicate two important longitudinal effects between academic motivation and social integration. First, students' feelings of amotivation were demonstrated to have a negative influence on perceptions of social integration, after controlling for students' initial scores on amotivation and gender (RQ1). This finding shows that students with a total lack of motivation at the start of the first year are less socially integrated at the end of the first year of higher education. This means that students' amotivation level seems to be crucial in explaining changes in experiences of social integration.

Secondly, students' experiences of social integration at the start were shown to have a positive influence on identified regulation at the end of the first year of higher education, after controlling for their initial score on social integration and gender (RQ2). When students are experiencing positive peer interactions at the start of the first year of higher education, they are more motivated for studying because of its personal relevance at the end of the first year of higher education. This means that social integration can play a crucial role in positively changing students' identified regulation during the first year of higher education.

These results further support the presence of reciprocal effects between academic motivation and social integration across the first year of higher education. This is consistent with the theoretical expectations that peer involvement can foster students towards more autonomous forms of regulation and that students' social integration can be affected by their initial score on academic motivation, more specifically by their amotivation score.

Limitations and future perspectives

Some potential limitations of this study need to be considered. First, the data contained some missing values, as is frequently observed in longitudinal studies. However, full information robust maximum likelihood estimation was used to reduce possible bias caused by incomplete data (Enders & Bandalos, 2001). Secondly, only two measurement waves were used in this study. To enhance our understanding of the reciprocal links between academic motivation and social integration across time, further work could involve the use of more measurement waves during the first year of higher education.

Next, this study only focused on the role of how students' experience their interactions with fellow students in relation to academic motivation. Further work is needed to explore the role of other strongly related concepts of social integration, for instance, by exploring the link between peer support and academic motivation. Finally, some expected longitudinal effects were not found, such as the interrelationship between social integration and controlled motivation. As this is the first study, to our knowledge, that has investigated the longitudinal reciprocal relationship between academic motivation and social integration, replication of this study in other higher education contexts is desirable.

Further research could also examine this interrelationship across different groups of students. For instance, the difference between types of study programmes could be explored, as former research indicates that physical education students experience a lower level of support from peers than scientific education students (De Clercq, Galand, Dupont, & Frenay, 2013). Additionally, investigating differences between minority and majority students on the interplay between academic motivation and social integration could be an interesting focus for further research work. Previous research indicates that differences exist between minority and majority students on the relationships between the type of peer interactions (formal or informal) and students' sense of belonging to the university (Meeuwisse et al., 2010).

Practical implications

The results of this study are relevant for practice, as they underline the reciprocal relationship between academic motivation and social integration across the first year of higher education. First, the results stress the importance of supporting less motivated students at the start of the first year, as these students possibly may feel even more socially isolated from fellow students at the end of the first year of higher education. Moreover, highly amotivated students are more likely to withdraw from studies or to have lower first-year academic performance (Litalien et al., 2017; Vanthournout et al., 2012). Students with sufficient motivation (or less amotivated students) seem to have a greater chance of persisting with their study programme and obtaining more credits (Litalien et al., 2017; Vanthournout et al., 2012). Therefore, it might be relevant and helpful to map students' motivation at the start of higher education and to identify less motivated students, in order to provide this group with additional support

with regard to their study choice process. In addition, teachers and student-counsellors could also support the motivational processes of first-year students by providing free choice of learning topics, explaining the relevance of the learning topic and by making learn milestones and goals more transparent for the students (Martens & Metzger, 2017).

Secondly, the results show that students' social integration can play a crucial role in positive changes in identified regulation during the first year of higher education. This underlines the importance of creating a teaching and learning environment which fosters students' social integration, especially at the start of the first year. This could be achieved by organising informal social activities in the first months of higher education. For example, sports or other informal activities can bring students together and can create possibilities to exchange experiences and feelings (Wagner & Brahm, 2017). Additionally, establishing a peer learning programme can foster students' social integration into higher education, as this intervention offers opportunities for students to connect to other students in an informal environment and to develop new friendships (Collings, Swanson, & Watkins, 2014; van der Meer, Wass, Scott, & Kokaua, 2017). An international well-used and well-researched academic support intervention is Supplemental Instruction (SI), also known as Peer-Assisted Learning (PAL) or Peer-Assisted Study Sessions (PASS) (Dawson, van der Meer, Skalicky & Cowley, 2014). These peer learning programmes have shown to be effective, as participation in these programmes seems to be related to, for instance, higher academic achievement scores (Dawson et al., 2014; van der Meer et al., 2017) and to a greater level of social integration (Dawson et al., 2014; Hixenbaugh, Dewart, Drees & Williams, 2005).

Furthermore, it seems to be especially important to support students with more academic and adjustment problems, as previous research indicated that these students have a greater desire to get help, guidance or emotional support from someone else (Dennis et al., 2005). Additionally, several studies highlighted the importance of the interactions between students in explaining first year academic achievement (Allen, Robbins, Casillas, & Oh, 2008; Brouwer, Jansen, Flache, & Hofman, 2016; De Clercq et al., 2013; Severiens & Wolff, 2008). Developing more and better friendships with fellow students seems to have a positive impact on obtaining more credits in the first year of higher education (Brouwer et al., 2016; Severiens & Wolff, 2008).

In supporting students' social integration, the role of the academic staff should not be neglected. Teachers play a crucial role in facilitating students' interactions with peers and providing a forum in which students can explore their opinions and identities (Freeman et al., 2007). This could be done by creating learning communities within the classrooms by dividing students into smaller work groups with a meaningful task (Quinlan, 2016). This can help students to meet others and to feel a sense of belonging.

To conclude, the present study deepens our understanding of the longitudinal directional links between students' academic motivation and social integration during the first year of higher education. The results point at the importance of creating a learning environment that fosters the interactions between fellow students and supports less motivated students. This is especially important in the current educational context, where many freshmen struggle with the transition to higher education and even fail or drop out before completion of their study programme (OECD, 2013).

Appendix

Measurement invariance over time

Model		Model comparison								
	Model description	χ^2	<i>df</i>	<i>CFI</i>	<i>RMSEA</i>	<i>BIC</i>	$\Delta\chi^2$	Δdf	<i>p-value</i>	ΔCFI
Intrinsic motivation	baseline	3.12	3	1.000	0.01	8504.19				
	invariant loadings	6.59	5	0.999	0.02	8493.00	3.48	2	0.18	0.001
	invariant intercepts	18.00	8	0.997	0.04	8484.90	11.41	3	0.01	0.002
Identified regulation	baseline	1.33	3	1.000	< 0.001	8688.56				
	invariant loadings	5.32	5	1.000	0.01	8678.89	4.00	2	0.14	0.000
	invariant intercepts	11.72	8	0.996	0.02	8664.78	6.39	3	0.09	0.004
Introjected regulation	baseline	9.73	5	0.997	0.03	11284.38				
	invariant loadings	11.04	7	0.997	0.03	11272.03	1.32	2	0.52	0.000
	invariant intercepts	15.77	10	0.996	0.03	11256.26	4.73	3	0.19	0.001
External regulation	baseline	9.42	5	0.998	0.03	10122.68				
	invariant loadings	9.94	7	0.998	0.02	10109.54	0.52	2	0.77	0.000
	invariant intercepts	16.29	10	0.997	0.03	10095.38	6.35	3	0.10	0.001
Amotivation	baseline	7.76	5	0.998	0.02	8510.40				
	invariant loadings	8.74	7	0.999	0.02	8497.72	0.98	2	0.61	0.001
	invariant intercepts	16.80	10	0.995	0.03	8485.28	8.06	3	0.04	0.004
Social integration	baseline	313.78	47	0.937	0.08	24351.83				
	invariant loadings	323.89	52	0.936	0.08	24327.78	10.12	5	0.07	0.001
	invariant intercepts	326.78	58	0.937	0.07	24289.66	2.88	6	0.82	0.001

References

- Allen, J., Robbins, S. B., Casillas, A., & Oh, I.-S. (2008). Third-year college retention and transfer: Effects of academic performance, motivation, and social connectedness. *Research in Higher Education, 49*(7), 647-664. doi:10.1007/s11162-008-9098-3
- Appleton, J. J., Christenson, S. L., & Furlong, M. J. (2008). Student engagement with school: Critical conceptual and methodological issues of the construct. *Psychology in the Schools, 45*(5), 369-386. doi:10.1002/pits.20303
- Assor, A., Vansteenkiste, M., & Kaplan, A. (2009). Identified versus introjected approach and introjected avoidance motivations in school and in sports: The limited benefits of self-worth strivings. *Journal of Educational Psychology, 101*(2), 482-497. doi:10.1037/a0014236
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin, 117*(3), 497-529. doi:10.1037/0033-2909.117.3.497
- Bean, J. P., & Metzner, B. S. (1985). A conceptual model of nontraditional undergraduate student attrition. *Review of Educational Research, 55*(4), 485-540. doi:10.3102/00346543055004485
- Beekhoven, S., De Jong, U., & Van Hout, H. (2002). Explaining academic progress via combining concepts of integration theory and rational choice theory. *Research in Higher Education, 43*(5), 577-600. doi:10.1023/a:1020166215457
- Bollen, K. A., & Curran, P. J. (2006). *Latent curve models: A structural equation perspective*. New Jersey: John Wiley & Sons.
- Bosse, E., & Trautwein, C. (2014). Individuelle und institutionelle Herausforderungen der Studieneingangsphase. *Zeitschrift für Hochschulentwicklung, 9*(5), 41-62.
- Braxton, J. M., Jones, W. A., Hirschy, A. S., & Hartley III, H. V. (2008). The role of active learning in college student persistence. *New Directions for Teaching and Learning, 2008*(115), 71-83. doi:10.1002/tl.326
- Briggs, A. R. J., Clark, J., & Hall, I. (2012). Building bridges: Understanding student transition to university. *Quality in Higher Education, 18*(1), 3-21. doi:10.1080/13538322.2011.614468

- Brouwer, J., Jansen, E., Flache, A., & Hofman, A. (2016). The impact of social capital on self-efficacy and study success among first-year university students. *Learning and Individual Differences*, 52, 109-118. doi:http://dx.doi.org/10.1016/j.lindif.2016.09.016
- Browne, M. W., & Cudeck, R. (1992). Alternative ways of assessing model fit. *Sociological Methods Research*, 21(2), 230-258. doi:10.1177/0049124192021002005
- Buote, V. M., Pancer, S. M., Pratt, M. W., Adams, G., Birnie-Lefcovitch, S., Polivy, J., & Wintre, M. G. (2007). The importance of friends. *Journal of Adolescent Research*, 22(6), 665-689. doi:10.1177/0743558407306344
- Byrne, B. M. (2010). *Structural equation modeling using AMOS: Basic concepts, applications, and programming*. New York: Routledge.
- Byrne, M., & Flood, B. (2005). A study of accounting students' motives, expectations and preparedness for higher education. *Journal of Further and Higher Education*, 29(2), 111-124. doi:10.1080/03098770500103176
- Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal*, 9(2), 233-255. doi:10.1207/s15328007sem0902_5
- Christie, H., Tett, L., Cree, V. E., Hounsell, J., & McCune, V. (2008). 'A real rollercoaster of confidence and emotions': Learning to be a university student. *Studies in Higher Education*, 33(5), 567-581. doi:10.1080/03075070802373040
- Coertjens, L., Donche, V., De Maeyer, S., Vanthournout, G., & Van Petegem, P. (2012). Longitudinal measurement invariance of likert-type learning strategy scales: Are we using the same ruler at each wave? *Journal of Psychoeducational Assessment*, 30(6), 577-587. doi:10.1177/0734282912438844
- Coertjens, L., Donche, V., De Maeyer, S., Vanthournout, G., & Van Petegem, P. (2017). To what degree does the missing-data technique influence the estimated growth in learning strategies over time? A tutorial example of sensitivity analysis for longitudinal data. *PLoS ONE*, 12(9), e0182615. doi:10.1371/journal.pone.0182615

- Collings, R., Swanson, V., & Watkins, R. (2014). The impact of peer mentoring on levels of student wellbeing, integration and retention: A controlled comparative evaluation of residential students in UK higher education. *Higher Education, 68*(6), 927-942. doi:10.1007/s10734-014-9752-y
- Connell, J. P., & Wellborn, J. G. (1991). Competence, autonomy, and relatedness: A motivational analysis of self-system processes. In M. R. Gunnar & L. A. Sroufe (Eds.), *Self processes and development* (pp. 43-77). Hillsdale, NJ, England: Lawrence Erlbaum Associates.
- Dawson, P., van der Meer, J., Skalicky, J., & Cowley, K. (2014). On the effectiveness of supplemental instruction: A systematic review of supplemental instruction and peer-assisted study sessions literature between 2001 and 2010. *Review of Educational Research, 84*(4), 609-639. doi:10.3102/0034654314540007
- De Clercq, M., Galand, B., Dupont, S., & Frenay, M. (2013). Achievement among first-year university students: An integrated and contextualised approach. *European Journal of Psychology of Education, 28*(3), 641-662. doi:10.1007/s10212-012-0133-6
- Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227-268. doi:10.1207/S15327965pli1104_01
- Deci, E. L., & Ryan, R. M. (2002). *Handbook of self-determination research*. Rochester, NY: University Rochester Press.
- Deci, E. L., & Ryan, R. M. (2008a). Facilitating optimal motivation and psychological well-being across life's domains. *Canadian Psychology/Psychologie canadienne, 49*(1), 14-23. doi:10.1037/0708-5591.49.1.14
- Deci, E. L., & Ryan, R. M. (2008b). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology/Psychologie canadienne, 49*(3), 182-185. doi:10.1037/a0012801
- Dennis, J. M., Phinney, J. S., & Chuateco, L. I. (2005). The role of motivation, parental support, and peer support in the academic success of ethnic minority first-generation college students. *Journal of College Student Development, 46*(3), 223-236. doi:10.1353/csd.2005.0023

- Donche, V., Coertjens, L., van Daal, T., De Maeyer, S., & Van Petegem, P. (2014). Understanding differences in student learning and academic achievement in first year higher education: an integrated research perspective. In D. Gijbels, V. Donche, J. T. E. Richardson, & J. D. Vermunt (Eds.), *Learning patterns in higher education: Dimensions and research perspectives* (pp. 214-231). London: Routledge.
- Donche, V., De Maeyer, S., Coertjens, L., van Daal, T., & Van Petegem, P. (2013). Differential use of learning strategies in first-year higher education: The impact of personality, academic motivation, and teaching strategies. *British Journal of Educational Psychology*, 83(2), 238-251. doi:10.1111/bjep.12016
- Donche, V., & Van Petegem, P. (2008). The validity and reliability of the Short Inventory of Learning Patterns. In E. Cools, H. Van den Broeck, C. Evans, & T. Redmond (Eds.), *Style and cultural differences: How can organisations, regions and countries take advantage of style differences* (pp. 49-59). Gent, Belgium: Vlerick Leuven Gent Management School.
- Eisenberg, D., Hunt, J., & Speer, N. (2013). Mental health in american colleges and universities: Variation across student subgroups and across campuses. *The Journal of Nervous and Mental Disease*, 201(1), 60-67. doi: 10.1097/NMD.0b013e31827ab077
- Enders, C. K., & Bandalos, D. L. (2001). The relative performance of full information maximum likelihood estimation for missing data in structural equation models. *Structural Equation Modeling: A Multidisciplinary Journal*, 8(3), 430-457. doi:10.1207/s15328007sem0803_5
- Flemish Government. (2012). *Hoger onderwijs in cijfers: academiejaar 2011-2012 [Higher education in numbers – academic year 2011-2012]*. Retrieved from http://www.ond.vlaanderen.be/hogeronderwijs/werken/studentadmin/studentengegevens/hoger_onderwijs_in_cijfers_2011-2012.pdf
- Freeman, T. M., Anderman, L. H., & Jensen, J. M. (2007). Sense of belonging in college freshmen at the classroom and campus levels. *The Journal of Experimental Education*, 75(3), 203-220. doi:10.3200/JEXE.75.3.203-220
- Gale, T., & Parker, S. (2012). Navigating change: A typology of student transition in higher education. *Studies in Higher Education*, 39(5), 734-753. doi:10.1080/03075079.2012.721351

- Hixenbaugh, P., Dewart, H., Drees, D., & Williams, D. (2006). Peer E-Mentoring: Enhancement of the First Year Experience. *Psychology Learning & Teaching*, 5(1), 8-14. doi:10.2304/plat.2005.5.1.8
- Hu, L. t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1-55. doi:10.1080/10705519909540118
- Jenert, T., Brahm, T., Gommers, L., & Kühner, P. (2017). How do they find their place? A typology of students' enculturation during the first year at a business school. *Learning, Culture and Social Interaction*, 12, 87-99. doi:https://doi.org/10.1016/j.lcsi.2016.12.001
- Kember, D. (2001). Beliefs about knowledge and the process of teaching and learning as a factor in adjusting to study in higher education. *Studies in Higher Education*, 26(2), 205-221. doi:10.1080/03075070120052116
- Kyndt, E., Coertjens, L., van Daal, T., Donche, V., Gijbels, D., & Van Petegem, P. (2015). The development of students' motivation in the transition from secondary to higher education: A longitudinal study. *Learning and Individual Differences*, 39(0), 114-123. doi:http://dx.doi.org/10.1016/j.lindif.2015.03.001
- Kyndt, E., Donche, V., Trigwell, K., & Lindblom-Ylänne, S. (2017). *Higher education transitions: Theory and research*. London and New York: Routledge.
- Larcombe, W., Finch, S., Sore, R., Murray, C. M., Kentish, S., Mulder, R. A., . . . Williams, D. A. (2016). Prevalence and socio-demographic correlates of psychological distress among students at an Australian university. *Studies in Higher Education*, 41(6), 1074-1091. doi:10.1080/03075079.2014.966072
- Litalien, D., Morin, A. J. S., Gagné, M., Vallerand, R. J., Losier, G. F., & Ryan, R. M. (2017). Evidence of a continuum structure of academic self-determination: A two-study test using a bifactor-ESEM representation of academic motivation. *Contemporary Educational Psychology*, 51, 67-82. doi:http://dx.doi.org/10.1016/j.cedpsych.2017.06.010
- Martens, T., & Metzger, C. (2017). Different transitions towards learning at university: Exploring the heterogeneity of motivational processes. In E. Kyndt, V. Donche, K. Trigwell & S. Lindblom-

- Yläne (Eds), *Higher education transitions: Theory and research* (pp. 31-46). New York: Routledge.
- Meeuwisse, M., Severiens, S. E., & Born, M. P. (2010). Learning environment, interaction, sense of belonging and study success in ethnically diverse student groups. *Research in Higher Education, 51*(6), 528-545. doi:10.1007/s11162-010-9168-1
- Muthén, L. K., & Muthén, B. O. (1998–2012). *Mplus User's Guide*. (7th ed.). Los Angeles, CA: Muthén & Muthén.
- Neuville, S., Frenay, M., Schmitz, J., Boudrenghien, G., Noël, B., & Wertz, V. (2007). Tinto's theoretical perspective and expectancy-value paradigm: A confrontation to explain freshmen's academic achievement. *Psychologica Belgica, 47*(1), 31-50. doi: <http://doi.org/10.5334/pb-47-1-31>
- Niemiec, C. P., & Ryan, R. M. (2009). Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. *Theory and Research in Education, 7*(2), 133-144. doi:10.1177/1477878509104318
- OECD. (2013). *The state of higher education 2013*. Retrieved from <http://www.oecd.org/edu/imhe/StateofHigherEducation2013-ExecutiveSummary.pdf>.
- Pan, Y., & Gauvain, M. (2012). The continuity of college students' autonomous learning motivation and its predictors: A three-year longitudinal study. *Learning and Individual Differences, 22*(1), 92-99. doi:<http://dx.doi.org/10.1016/j.lindif.2011.11.010>
- Pascarella, E. T., & Terenzini, P. T. (1980). Predicting freshman persistence and voluntary dropout decisions from a theoretical model. *The Journal of Higher Education, 51*(1), 60-75. doi:10.2307/1981125
- Perry, C., & Allard, A. (2003). Making the connections: Transition experiences for first-year education students. *The Journal of Educational Enquiry, 4*(2), 74-89.
- Próspero, M., & Vohra-Gupta, S. (2007). First generation college students: Motivation, integration, and academic achievement. *Community College Journal of Research and Practice, 31*(12), 963-975. doi:10.1080/10668920600902051
- Quinlan, K. M. (2016). How emotion matters in four key relationships in teaching and learning in higher education. *College Teaching, 64*(3), 101-111. doi:10.1080/87567555.2015.1088818

- Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university students' academic performance: A systematic review and meta-analysis. *Psychological Bulletin*, *138*(2), 353-387. doi:10.1037/a0026838
- Rienties, B., Tempelaar, D., Van den Bossche, P., Gijsselaers, W., & Segers, M. (2009). The role of academic motivation in computer-supported collaborative learning. *Computers in Human Behavior*, *25*(6), 1195-1206. doi:http://dx.doi.org/10.1016/j.chb.2009.05.012
- Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. *Psychological Bulletin*, *130*(2), 261-288. doi:10.1037/0033-2909.130.2.261
- Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization: Examining reasons for acting in two domains. *Journal of Personality and Social Psychology*, *57*(5), 749-761. doi:10.1037/0022-3514.57.5.749
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68-78. doi:10.1037/0003-066x.55.1.68
- Selig, J. P., & Little, T. D. (2012). Autoregressive and cross-lagged panel analysis for longitudinal data. In B. Laursen, T. D. Little, & N. A. Card (Eds.), *Handbook of developmental research methods* (pp. 265-278). New York: The Guilford Press.
- Severiens, S., & Wolff, R. (2008). A comparison of ethnic minority and majority students: Social and academic integration, and quality of learning. *Studies in Higher Education*, *33*(3), 253-266. doi:10.1080/03075070802049194
- Sierens, E. (2010). *Autonomy-supportive, structuring, and psychologically controlling teaching: Antecedents, mediators, and outcomes in late adolescents* (Doctoral dissertation). KU Leuven, Leuven, Belgium.
- Spady, W. G. (1970). Dropouts from higher education: An interdisciplinary review and synthesis. *Interchange*, *1*(1), 64-85. doi:10.1007/bf02214313
- Tinajero, C., Martínez-López, Z., Rodríguez, M. S., Guisande, M. A., & Páramo, M. F. (2015). Gender and socioeconomic status differences in university students' perception of social support.

European Journal of Psychology of Education, 30(2), 227-244. doi:10.1007/s10212-014-0234-5

- Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research*, 45(1), 89-125. doi:10.3102/00346543045001089
- Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition*. Chicago: University of Chicago Press.
- Tinto, V. (1997). Classrooms as communities: Exploring the educational character of student persistence. *The Journal of Higher Education*, 68(6), 599-623. doi:10.2307/2959965
- Tinto, V. (2012). *Completing college: Rethinking institutional action*. Chicago, The University of Chicago Press.
- Urduan, T., & Schoenfelder, E. (2006). Classroom effects on student motivation: Goal structures, social relationships, and competence beliefs. *Journal of School Psychology*, 44(5), 331-349. doi:http://dx.doi.org/10.1016/j.jsp.2006.04.003
- Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F. (1992). The academic motivation scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement*, 52(4), 1003-1017. doi:10.1177/0013164492052004025
- van der Meer, J., Wass, R., Scott, S., & Kokaua, J. (2017). Entry characteristics and participation in a peer learning program as predictors of first-year students' achievement, retention, and degree completion. *AERA Open*, 3(3), 1-13. doi:10.1177/2332858417731572
- van der Wende, M. C. (2003). Globalisation and access to higher education. *Journal of Studies in International Education*, 7(2), 193-206. doi:10.1177/1028315303007002006
- Vandenberg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research. *Organizational Research Methods*, 3(1), 4-70. doi:10.1177/109442810031002
- Vansteenkiste, M., Lens, W., & Deci, E. L. (2006). Intrinsic versus extrinsic goal contents in self-determination theory: Another look at the quality of academic motivation. *Educational Psychologist*, 41(1), 19-31. doi:10.1207/s15326985ep4101_4

- Vansteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. *Journal of Psychotherapy Integration, 23*(3), 263-280. doi:10.1037/a0032359
- Vansteenkiste, M., Sierens, E., Soenens, B., Luyckx, K., & Lens, W. (2009). Motivational profiles from a self-determination perspective: The quality of motivation matters. *Journal of Educational Psychology, 101*(3), 671-688. doi:10.1037/a0015083
- Vanthournout, G., Gijbels, D., Coertjens, L., Donche, V., & Van Petegem, P. (2012). Students' persistence and academic success in a first-year professional bachelor program: The influence of students' learning strategies and academic motivation. *Education Research International, 2012*, 10 pages. doi:10.1155/2012/152747
- Wagner, D. & Brahm, T. (2017). Fear of academic failure as a self-fulfilling prophecy. In E. Kyndt, V. Donche, K. Trigwell & S. Lindblom-Ylänne (Eds), *Higher education transitions: Theory and research* (pp. 13-30). New York: Routledge.
- Wentzel, K. R. (2005). Peer relationships, motivation, and academic performance at school. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 279-296). New York: The Guilford Press.
- Wigfield, A., & Eccles, J. S. (2002). *Development of achievement motivation*. London: Academic Press.
- Wilcox, P., Winn, S., & Fyvie-Gauld, M. (2005). 'It was nothing to do with the university, it was just the people': The role of social support in the first-year experience of higher education. *Studies in Higher Education, 30*(6), 707-722. doi:10.1080/03075070500340036
- Wilson, K. L., Murphy, K. A., Pearson, A. G., Wallace, B. M., Reher, V. G. S., & Buys, N. (2014). Understanding the early transition needs of diverse commencing university students in a health faculty: Informing effective intervention practices. *Studies in Higher Education, 41*(6), 1-18. doi:10.1080/03075079.2014.966070

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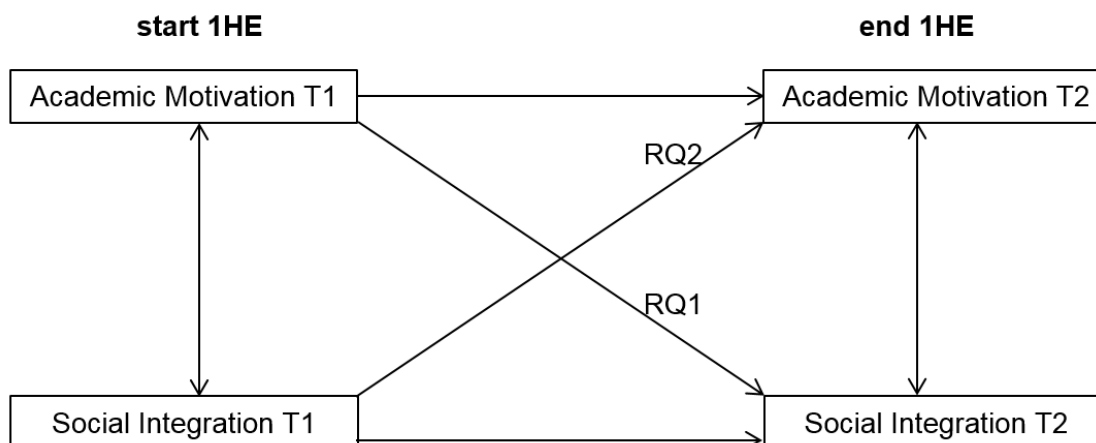


Fig. 1 The conceptual autoregressive cross-lagged model of the interplay between academic motivation and social integration across the first year of higher education (1HE)

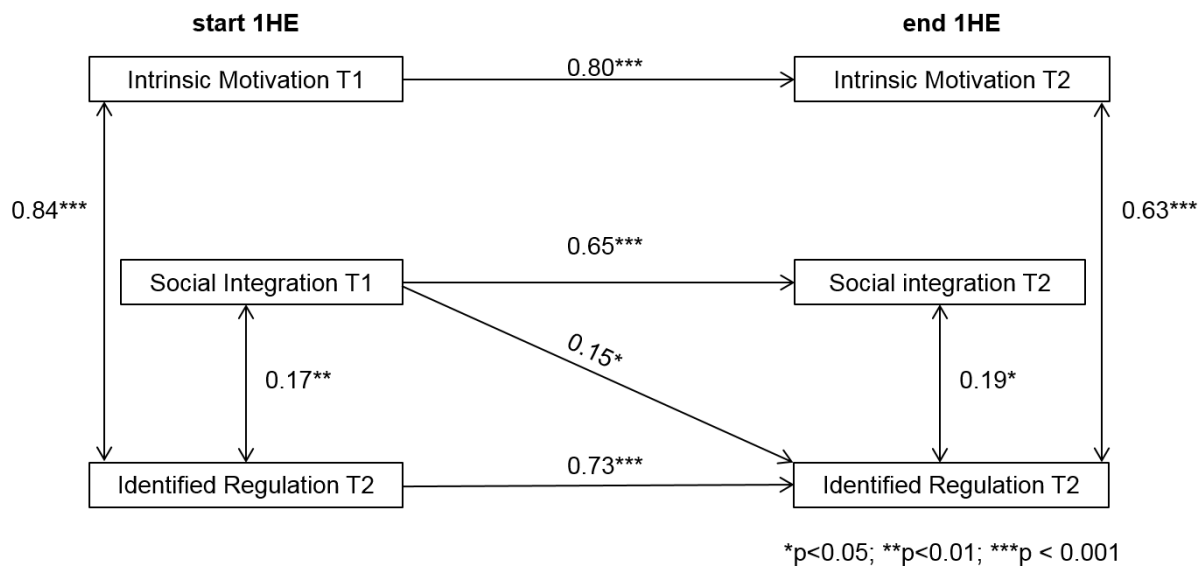


Fig. 2 Significant results of the estimated cross-lagged model for the types of autonomous motivation (intrinsic and identified regulation) and social integration (Model 1)

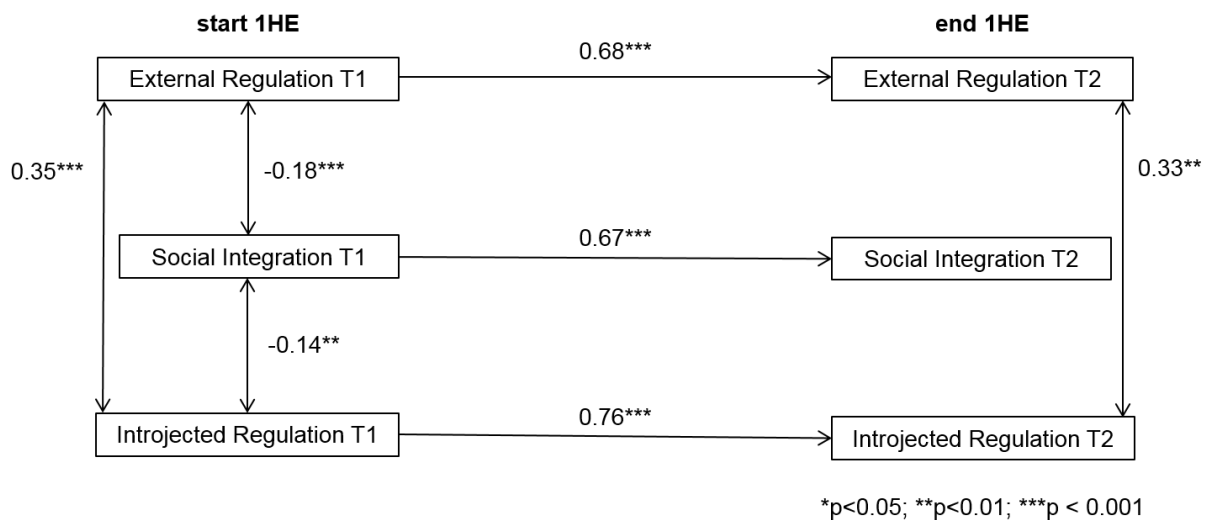


Fig. 3 Significant results of the estimated cross-lagged model for the types of controlled motivation (introjected and external regulation) and social integration (Model 2)

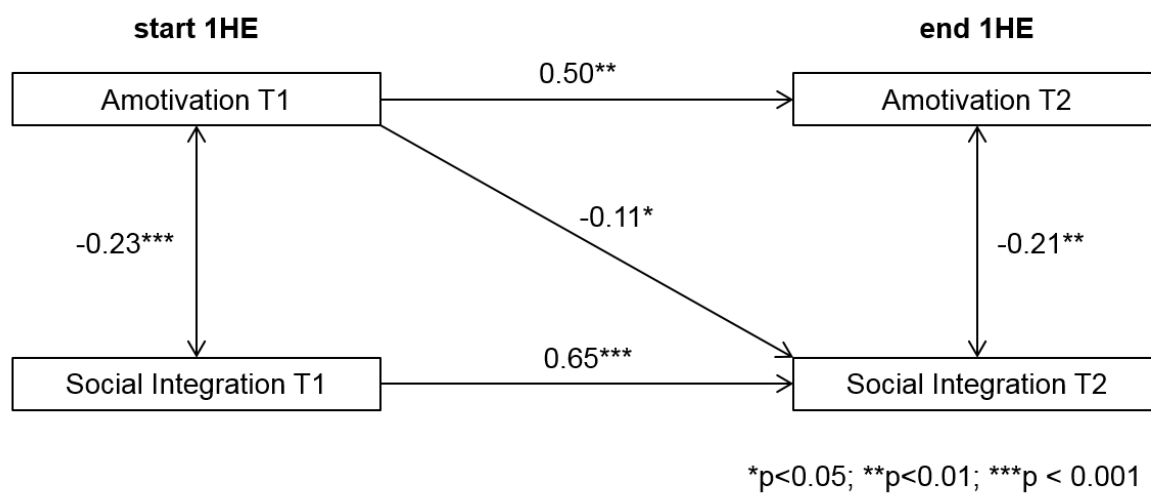


Fig. 4 Significant results of the estimated cross-lagged model for amotivation and social integration (Model 3)

List of tables

Table 1 Overview of all used scales, including an item example, the number of items (N), the mean (\bar{x}), the standard deviation (*SD*) and the reliability (α) of each scale

Scale	Item example	N	Wave 1			Wave 2		
			\bar{x}	<i>SD</i>	α	\bar{x}	<i>SD</i>	α
Social integration	I find it difficult to interact with fellow students. (Recoded)	6	5.52	1.17	0.86	5.47	1.15	0.88
Motivation	I'm studying because...							
Intrinsic motivation	...I enjoy doing it.	3	2.96	0.97	0.90	3.02	0.91	0.88
Identified regulation	...It is personally important to me.	3	4.17	0.67	0.69	4.13	0.67	0.72
Introjected regulation	...I want others to think I'm smart.	3	3.41	1.03	0.76	3.41	1.01	0.78
External regulation	...others (parents, friends, etc.) oblige me to do so.	3	2.11	0.92	0.78	2.13	0.96	0.82
Amotivation	Honestly, I do not know, it feels like I am wasting my time at school.	3	1.50	0.67	0.78	1.57	0.78	0.83

Table 2 Fit indices for each tested model concerning the relationship between academic motivation and social integration

Model	CFI	TLI	RMSEA	SRMR
Model 1: the types of autonomous motivation and social integration	0.92	0.91	0.05	0.08
Model 2: the types of controlled motivation and social integration	0.93	0.92	0.04	0.06
Model 3: amotivation and social integration	0.94	0.93	0.04	0.05