

The Relationships Between Need-Supportive Interactions With Peers and Teachers, Perceived Academic Control, and Academic Success

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ABSTRACT

This study discusses the relationships between students' need-supportive interactions, perceived academic control, and academic success. The survey involved 192 undergraduate students from different applied sciences universities in The Netherlands. The study examined if students' interactions with peers and teachers, in support of their needs (relatedness, autonomy, and competence), would improve perceptions of academic control and academic success. The constructs of perceived academic control, basic psychological needs, and students' formal and informal interaction with peers and teachers were linked to each other in a path model. The findings of path analysis showed that need-supportive interactions predicted positive perceptions of academic control and academic success. Most relevant to positive perceptions of academic control were students' formal interactions with peers and teachers supporting their autonomy and competence. Positive perceptions of academic control subsequently supported academic success.

Keywords: student interaction; basic psychological needs; perceived academic control; academic success; social integration; academic integration.

INTRODUCTION

Almost 59% of the students in the USA (National Center for Education Statistics[NCES], 2019) and 53% of students in The Netherlands (Central Bureau for Statistics[CBS], 2018) who started a 4-year bachelor's degree program at a public college in 2010 graduated within six years. Students' ultimate success indicates that they maintained a certain level of involvement, motivation, and control over their academic progress when coping with a variety of circumstances such as difficult classes, novel academic tasks, or failing exams in the course of their college career (Ruthig et al., 2008).

The literature describes these students as having an internal locus of academic control (Weiner, 1986). Students with an internal locus of control perceive ownership of their academic progress and try hard to overcome the obstacles they face. In contrast, students with an external locus of control believe that difficulties are caused by powerful others, and therefore coping successfully with problems depends largely on external factors.

Therefore, understanding what factors in the learning environment support an internal locus of control may provide additional opportunities to improve academic success. In this study, we focus on the relationship between students' daily interactions in college and perception of control. Previous suggestions on how to improve the perception of control, such as attributional retraining, mainly focused on classroom intervention by teachers (Stewart et al., 2010; Haynes et al., 2009). How students' broader involvement with peers and teachers in the college environment may contribute to positive perceptions of control was less explored.

Studies that examined students' interactions showed that students who were better integrated into the social and academic life of college were more likely to persist (Tinto, 1993). In addition, self-determination theory (Ryan & Deci, 2017) suggests that when interactions in the social environment of college support the psychological needs (relatedness, autonomy, and competence), students become more autonomously motivated learners, which improves their self-regulation and academic performance. The positive link between students' interaction and support of the psychological needs suggested by self-determination theory was confirmed in a previous study by Crul (2018). This study showed that students' formal and informal interactions with peers and teachers served psychological needs that contributed to academic success.

In this article, we explore in three steps the effect of students' formal and informal interactions with peers and teachers, their content (psychological needs), and their relationship with perceived academic control and academic success.

THEORETICAL FRAMEWORK

In this section, we first explain the different concepts we use for the methodological model we test. We start with the importance of interactions with peers and teachers for students' academic experience. Next, we introduce the concept of the psychological needs relatedness, autonomy, and competence, which brings in the importance of the content of interactions with peers and teachers. We test in the model which of the three needs are most relevant for academic control. Finally, we discuss the concept of academic control, which presents the idea that being in charge of the learning process and goals is essential for academic success.

Interactions

Interaction theorists support the belief that the more students get involved in academic experiences, the more likely they are to persist and succeed in college (Endo & Harpel, 1982; Astin, 1984; Tinto, 1993; Berger & Milem, 1999). Astin explains involvement as making an effort to study, interact with peers and teachers, spend time on campus, and participate in student organizations. Tinto describes involvement as students' social and academic integration into college, which is established through formal and informal interactions with peers (social integration) and with teachers (academic integration). In this study, we organize interactions based on Tinto's view of social and academic integration.

Social integration indicates that students feel connected to the social community of college, as they share close bonds with peers with whom they also collaborate in learning. Interactions with peers are seen as a critical predictor for intellectual involvement in college (Astin, 1993). For example, Sidelinger (2010) showed that students' friendly relationships with peers encouraged them to prepare for classes, which contributed to a supportive classroom atmosphere for discussions.

Formal peer interactions are, therefore, seen as a link between social and academic integration (Dwyer et al., 2004; Crul, 2018).

Academic integration indicates students' familiarity and ease with the academic culture, which is acquired through intellectual exchanges with the teachers in classrooms, as well as through informal conversations outside the classroom. For example, when teachers are easy to understand, offer clear examples, and repeat key concepts, students are more likely to become familiar with the course content and more easily engage in classroom conversations (Chesebro & Wanzer, 2006). When teachers additionally value their comments and questions, students feel recognized and academically endorsed (Ellis, 2000). Ongoing positive classroom experiences with the teacher may continue as friendly and supportive conversations outside the classroom, cementing students' sense of belonging in the academic environment of college (Hirschy & Wilson, 2002).

Classroom experiences, often seen as most important for students' intellectual growth (Tinto, 1993), are, therefore, not isolated instances in college but are events shaped through supportive formal and informal interactions with peers and teachers in the broader environment of college. Hence, improving students' involvement in learning and increasing their chances to persist requires a supportive nature of interactions. Accordingly, we discuss here the concept of basic psychological need support.

Need-Supportive Interactions: Relatedness, Autonomy, and Competence

Interactions are considered need-supportive when they promote the three psychological needs: relatedness, autonomy, and competence (Ryan & Deci, 2017). Relatedness need support refers to fostering close and friendly relationships with significant others (e.g., peers and teachers) in the learning environment. Support for relatedness makes students feel safe about opening up and sharing their perspectives with others. For example, students' familiarity and acceptance of each other are shown to assist classroom participation (Neer & Kircher, 1989). Autonomy need support refers to acknowledging student perspectives and choices to create personally meaningful connections with course content and learning objectives (ownership). For example, when teachers interacted with students, showing sincere interest in their perspective on topics, it engendered feelings of success and intrinsic involvement in learning (Koestner et al., 2008; Schrodts et al., 2006). Competence need support refers to the assistance of students' skill development through clear instructions and encouraging feedback, which makes them feel optimally challenged and effective in their progress towards goals. For example, teacher confirmation of students' skills and progress toward goals nurtured their sense of purpose and motivation. (Kenny et al., 2006; Schrodts et al., 2006).

Support for the psychological needs, as explained by self-determination theory (Ryan & Deci, 2017), fosters autonomous motivation and well-being. The theory further elaborates that students who experience higher levels of need support feel more intrinsically motivated to engage in activities. That is, when students find the activity itself to be enjoyable and rewarding, they are inclined to devote more time and effort towards trying out different strategies to master skills (Ryan & Deci, 2017; Skinner et al., 2008; Ratelle et al., 2007). In contrast, lower levels of need support point to less autonomous and more externally controlled motivation. That is, these students often feel that their participation in activities is controlled by external factors such as tasks being forced upon them by the teachers or the obligation to pass an exam. Consequently, students are more likely to feel a

disconnect with learning activities and thus less dedicated to succeeding (Ryan & Deci 2017; Skinner et al., 2008; Ratelle et al., 2007).

Generally, need supportive, as opposed to need thwarting, learning environments contribute to several positive academic outcomes, e.g., increased effort, self-regulation, (cognitive) engagement, enjoyment, persistence, and academic achievement (Jang et al., 2016; Ryan & Deci, 2017; Skinner et al., 2008; Vansteenkiste et al., 2005).

In sum, autonomous motivation as a consequence of needs support fosters more intrinsic reasons for involvement in learning, in contrast to externally controlled motivation.

Perceived Academic Control

Perceived academic control (PAC) refers to a belief in one's capacity to influence or predict academic outcomes (Perry et al., 2001, 2007; Ruthig et al., 2004). PAC, based on the concept of academic locus of control, is an extensively studied concept related to academic success (Rotter, 1966; DeCharms, 1992; Valentine et al., 2004; Collie et al., 2015).

The concept of academic control (Rotter, 1966; Weiner, 1986) refers to students' perception of the causes of academic outcomes. These perceptions can be placed on a continuum ranging from an internal to an external locus of control. Students with a more internal locus of control feel that they are the cause of the outcomes. In other words, they feel that they can influence the circumstances in a way that will result in desirable outcomes. Therefore, they are likely to explain positive academic outcomes as being a result of their own efforts, such as going to classes, planning and managing time to study, and using effective learning strategies, while attributing poor academic outcomes to a lack of such effort (Collie et al., 2015; Martin & Marsh, 2008; Ruthig et al., 2008). The consequence of students' belief that increased efforts lead to better outcomes is that they are more involved in learning activities and academically more successful (Martin & Marsh, 2008; Slideling, 2010). When students sense ownership and responsibility for their performance, they feel proud of their successes or ashamed of their failures (Basgall & Snyder, 1988). Past success gives them a sense of control over the learning outcomes, which makes them more motivated and persistent in their efforts (Hall et al., 2006; Perry et al., 2001).

In contrast, students with an external locus of control mindset feel that academic outcomes are mainly the result of external circumstances. Therefore, they are more likely to attribute poor performance to factors such as biased teachers, difficult exams, or just bad luck (Stipek, 1998). As these students feel that their academic progress depends on others, they are more prone to experiencing disengagement, anxiety, and boredom (Hall et al., 2006; Pekrun et al., 2004; Perry et al., 2001). Not feeling responsible for poor outcomes may have a negative influence on students' involvement in learning and future success (Martin & Marsh, 2008).

These studies indicate that to support academic success it is critical to improving perceptions of control, which requires a shift from external to an internal locus of causality in explaining academic outcomes. Attributional retraining that facilitates such a shift is a teacher-led intervention, where students reflect on their maladaptive explanations to replace those with the more adaptive internal locus of control view (Stewart et al., 2010; Haynes et al., 2009). Other suggestions to improve the perception of control require teachers to improve the clarity of lectures and classroom instructions

(Magnusson & Perry, 1989; Perry, 2003) while advising students on what effective strategies they could use to prepare for exams (Perry et al., 1996; Ruthig et al., 2008).

While the majority of these interventions are focused on some form of teacher–student interaction in a classroom setting, other opportunities to improve perceptions of control, associated with a variety of social and academic experiences in college, are less explored.

Current Study

Our discussion of the three concepts (interactions, psychological need support, and perceived academic control) shows that perception of academic control, which serves as a predictor of academic success, largely depends on students' efforts to get involved in learning, whereas involvement in learning, based on the concept of social and academic integration (Tinto, 1993), is shown to be associated with students' formal and informal interaction with peers and teachers in and outside the classroom context of college. In this study, we assume a positive link between interactions and perception of control, based on the belief of self-determination theory (Ryan & Deci, 2017) that when interactions satisfy the three basic psychological needs (relatedness, autonomy, and competence) students become more autonomously motivated in their efforts to be involved in learning, which, in turn, could increase their chances of gaining academic control.

In other words, we expect that the more student interactions support the psychological needs, the more students will feel in control of their academic progress and achieve academic success. To begin with, therefore, we hypothesize that academic success is predicted by an increased perception of academic control; secondly, that perception of academic control is predicted by need-supportive interactions. The hypothesized model shown in Figure 1 portrays the connections between student interactions, psychological needs, perceptions of control, and academic success.

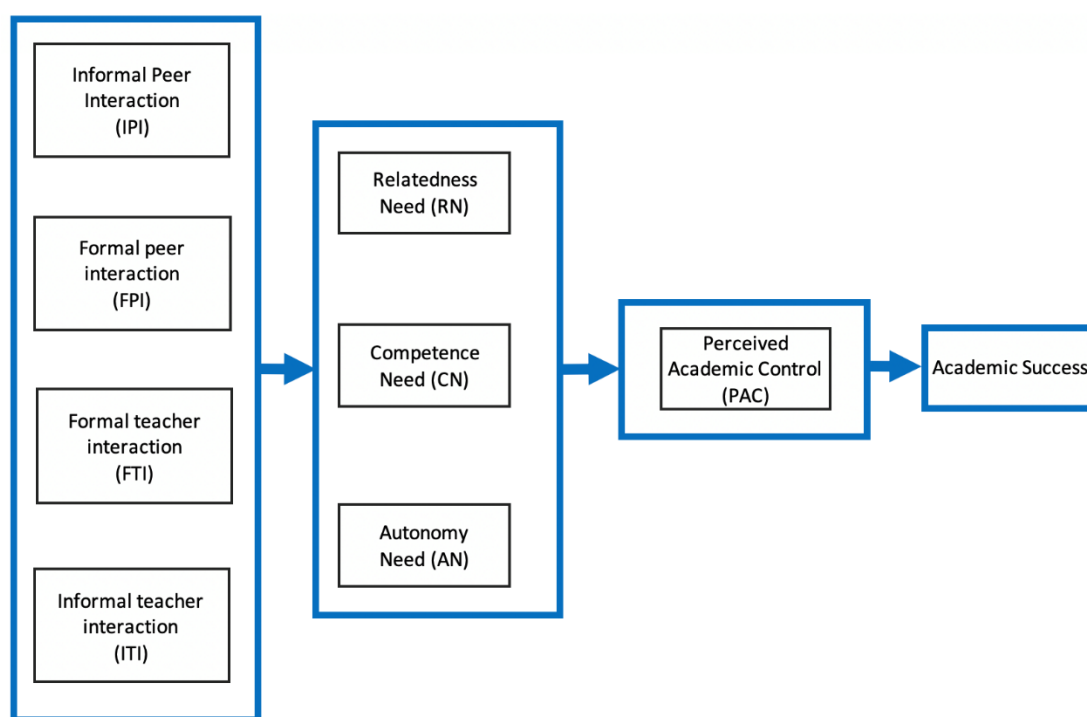


Figure1: The Hypothesized Model

METHOD

Data Collection

In the spring of 2017, an online questionnaire was distributed to undergraduate students of several universities teaching the applied sciences in The Netherlands. The questionnaire items were related to students' perception of academic control, the basic psychological needs, and interactions. Students rated each of the items on a 7-point Likert scale ranging from 1 (totally disagree) to 7 (totally agree). Academic success was determined by the number of credit points, ranging between 0 to 60 credits, obtained in the current academic year. Students submitted their credit points by e-mail at the end of the academic year, in July 2017 or in August 2017, with 192 students completing the questionnaire and providing the number of obtained credits. Students who did not complete the questionnaire or did not share their credits scores were removed from the sample.

The Respondents

The respondents, all enrolled in full-time programs of non-residential colleges, were 98 (51.0%) males, with 149 (77.6%) majority and 43 (22.4%) minority students, with an average age of 20.1 (SD = 2.68). The sample demographics show no significant differences with the Dutch population of undergraduates of applied sciences, consisting of 48.4% males with 74.6% majority and 25.4% minority students as reported by Statistics Netherlands (Central Bureau for Statistics, 2018). According to Statistics Netherlands, students are considered a minority when one or both parents were not born in The Netherlands.

Measurement of the Constructs

The first step of the model that looks at interactions with peers and teachers includes four subscales (1–4) that measured students' formal and informal interactions with peers and teachers. These questionnaires, developed and validated within the Dutch context by Severiens and colleagues (Meeuwisse et al., 2009; Severiens & Wolff, 2008; Severiens et al., 2006), are consistent with Tinto's model of social and academic integration (Tinto, 1993). The subscales are based on previous studies by Nora and Cabrera (1996), Pascarella and Terenzini (1980), and Berger and Milem (1999).

In the second step of the model (5–7), we have three basic psychological needs scales for relatedness, autonomy, and competence need, which were developed and validated by Chen and colleagues (2014) and have been used in several studies within different contexts (Campbell et al., 2015; Haerens et al., 2015).

In the last step (8) we have the perceived academic control scale developed by Perry et al. (2001), which has been used across several studies on college students' psychological health and academic performance (Perry et al., 2005; Ruthig et al., 2007, 2008). Table 1 shows an item example of the different scales, and the measure of the survey's reliability, the Cronbach's alpha coefficient.

Table 1 Scales With an Item Example and the Cronbach's alpha, N=192

	Scale	# of Items	Cronbach's alpha (α)
1	Formal Teacher Interaction (FTI): Teachers have time to answer questions (1 of 7)	7	.818
2	Informal Teacher Interaction (ITI) Teachers are not interested in my personal situation (reversed) (1 of 8)	8	.751
3	Formal Peer Interaction (FPI) Fellow students invite me to work together on school tasks (1 of 8)	8	.796
4	Informal Peer Interaction (IPI) I hardly know anyone here (reverse scored) (1 of 5)	5	.861
5	Relatedness (RN) I feel that the people I care about also care about me. (1 of 8)	8	.840
6	Autonomy need (AN) I feel a sense of choice and freedom in the things I undertake (1 of 8)	8	.809
7	Competence need (CN) I feel I can successfully complete difficult tasks (1 of 8)	8	.891
8	Perceived Academic Control (PAC) There is little I can do about my performance in university (reversed) (1 of 8)	8	.798

Analysis

The data was checked on normality and univariate and multivariate outliers before further analysis. The normality check showed values for Skewness between -1.188 and .370, within the acceptable range of ± 3 . The values for Kurtosis varying between -1.213 and 2.138 were also within the allowed range of ± 10 (Kline, 2011). The univariate outliers were two cases with z-scores outside the range of ± 3 . These cases were kept in the data set, as it occurred for only one variable for which the respondents' background showed no irregularities.

The first step of the data analysis was a description of the statistics (mean and standard deviation), followed by computation of Pearson correlations in SPSS. Subsequently, path analysis was performed, with Lavaan in R, to test the fit of the hypothesized model. In case of poor fit, the model was improved based on theoretical and empirical considerations. The acceptable ranges for indices for a good model fit are, χ^2 (Model fit statistic Chi-square) with $p > 0.05$, RMSEA (Root Mean Square Error Approximation Index) $< .06$, SRMR (Standardized Root Mean Square Residual) < 0.08 , and CFI (Comparative Fit Index) > 0.95 (Hu & Bentler, 1999). Bootstrapping was employed to examine indirect effects by calculating the p-value, standard error (SE), and 95% confidence interval (CI) (Kline, 2011; Hayes, 2009). The accepted model with the standardized path coefficients (β_i) and the indirect effects (IE) is presented in the results section.

RESULTS

Descriptive Statistics and Bivariate Correlations

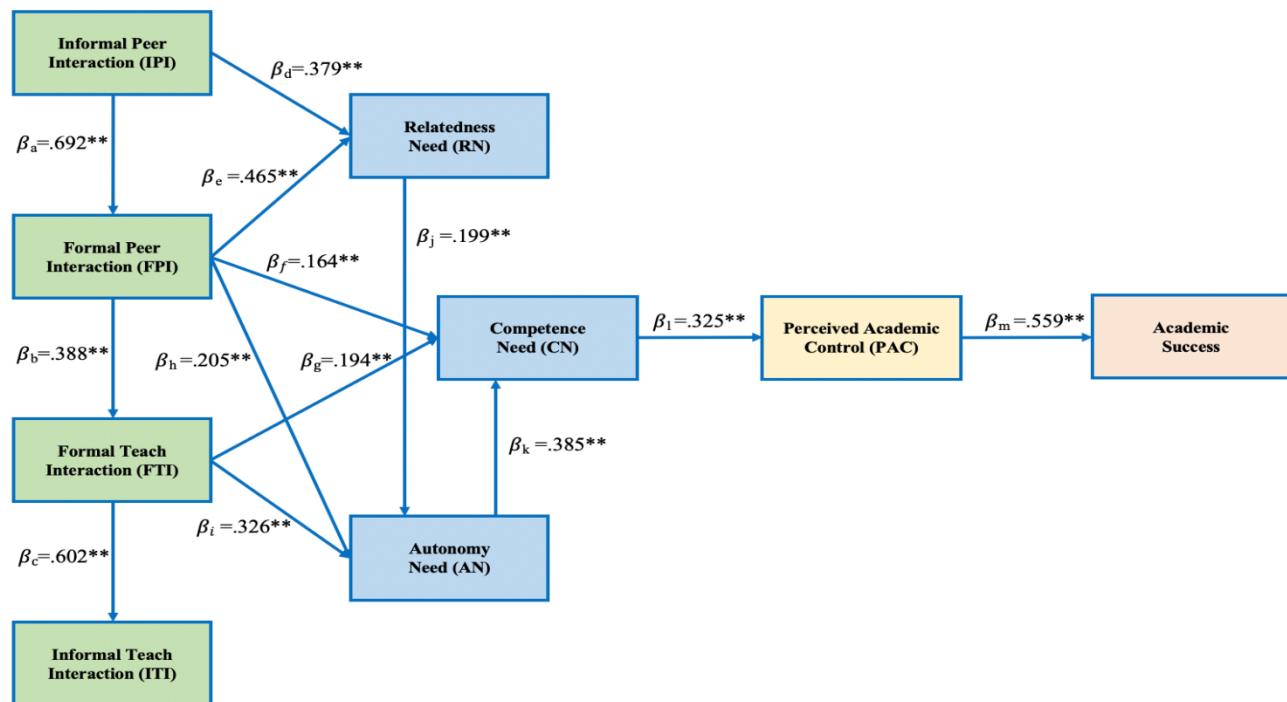
Table 2 below shows the mean, the standard deviation, and the bivariate correlations for the variables of student interaction, basic psychological needs, perceived academic control, and academic success. The bivariate correlations were all positive and significant for most of the variables. We only discuss here the associations related to perceived academic control, the primary variable of this study.

Table 2. Descriptive Statistics and Bivariate Correlations.

Variable	<i>M</i>	<i>SD</i>	IPI	FPI	FTI	ITI	RN	AN	CN	PAC
Informal Peer Interactions (IPI)	4.94	1.18	-							
Formal Peer Interaction (FPI)	5.12	0.88	.692**	-						
Formal Teacher Interaction (FTI)	4.69	0.93	.331**	.388**	-					
Informal Teacher Interaction (ITI)	3.79	0.97	.279**	.312**	.606**	-				
Relatedness Need (RN)	5.43	0.95	.701**	.727**	.377**	.328**	-			
Autonomy Need (AN)	4.64	0.89	.389**	.473**	.477**	.317**	.468**	-		
Competence Need (CN)	4.96	1.06	.301**	.422**	.442**	.301**	.345**	.556**	-	
Perceived Academic Control (PAC)	5.06	1.05	.092	.203**	.255**	.104	.219**	.287**	.326**	-
Academic Success (Credit Points)	43.10	18.00	.038	.049	.205**	.151*	.028	.164*	.247**	.555**

Note. *M*=mean; *SD*= standard deviation; *N*=192. * $p < .05$, ** $p < .01$

Perceived academic control showed the highest correlation with academic success ($r=.555$, $p<.01$). The relationship with psychological needs was the strongest for competence, followed by autonomy and relatedness (CN, $r=.326$, $p<.01$; AN, $r=.287$, $p<.01$; RN, $r=.219$, $p<.01$). The relationship between perceived control and student interactions was only significant for formal interactions with peers and teachers (FPI, $r=.203$, $p<.01$; FTI, $r=.255$, $p<.01$). This relationship gives the impression that the needs associated with formal interactions are most relevant for perceived academic control. However, relatedness being primarily linked with formal and informal peer interactions (FPI, $r=.727$, $p<.01$; IPI, $r=.701$, $p<.01$) indicates the central role of peers in students developing close bonds in college. For a more comprehensive picture of the associations, we applied path analysis to test the hypotheses.

**Figure 2 Path Model with the Standardized Path Coefficients (β).**

Note. ** $p < .01$

Hypothesis testing

The hypothesized model with the predictive paths—between the variables of student interaction and psychological needs, academic control, and academic success—was tested. The model showed a good fit (Hu & Bentler, 1999); $\chi^2=29.877$, $p\text{-value}=.121$, CFI = .988, RMSEA =.043, SRMR=.055. The significant paths with the standardized path coefficients (β) between the variables are presented in Figure 2.

Hypothesis 1: Perceived Academic Control Predicts Academic Success

The findings corroborated our first hypothesis, that perceived academic control supports academic success. The path model shows perceived academic control ($\beta_m=.559$, $p<.01$) to be the only variable to predict academic success directly. All the other variables, which only indirectly predict academic success, are linked to the perception of control. As support for perceived academic control indicates an increase in academic success, we next examine how the psychological needs and interactions supported perception of control.

Hypothesis 2: Perceived Academic Control is Predicted by Need-Supportive Interactions

To address this assumption, we subsequently examine which need-supportive paths and which interactions are most relevant to perceptions of control.

Among the psychological needs, competence need support presented the only variable to directly predict positive perceptions of control ($\beta_l=.325$, $p<.01$). Indirect support from the other psychological needs—autonomy and relatedness—showed significant values only for autonomy need (IEAN=.125, $p<.01$). The direct relationship and the larger effect size of competence over autonomy need support indicate its relative importance for the perception of control and academic success.

The interactions showed no significant direct relationships with the perception of control. The path model shows that all connections with the perception of control are through the support of psychological needs. These need-supportive interactions are the formal interactions with peers and teachers and informal interactions with peers. Informal interactions with teachers showed no significant relationship with any of the psychological needs.

Indirect Effects and Need-Supportive Paths

To determine which need(s) mattered most to positive perceptions of control, we calculated the indirect effects from all interactions through each of the three need-supportive paths. These indirect effects are presented in Table 3.

Table 3. The Indirect Effects of the Need-Supportive Paths on Perceptions of Control

Need Supportive Path	Indirect Effect Std. Coefficient	<i>p</i>	<i>SE</i>	95% <i>CI</i>
RN-AN-CN-PAC	.029 n.s.	.086	.017	.000–.069
AN-CN-PAC	.111**	.009	.046	.057–.256
CN-PAC	.195**	.006	.077	.083–.388
Total Indirect Effect (TIE)	.306**	.001	.087	.176–.527

Note. RN = Relatedness Need; AN=Autonomy Need; CN=Competence Need, *SE*= standard error, *CI*= confidence interval, ** $p<.01$

Table 3 shows that the two significant need supportive paths are through autonomy and competence needs. The need-supportive path through relatedness need ($IE=.29$, $p=.086$) was not significant and consequently is dropped in the following analysis.

Next, we examined the effects of the different need-supportive interactions on perceptions of control. The path model showed that the need-supportive paths through autonomy and competence needs were directly predicted by formal teacher interactions, directly and indirectly by formal peer interactions, and only indirectly by informal peer interactions. The indirect effects (IE) of the autonomy and competence need-supportive interactions on perceptions of control are presented in Table 4.

Table 4. Indirect Effects of the Need-Supportive Interactions on Perceptions of Control.

Autonomy and Competence Need-supportive interactions	Indirect Effect Std. Coefficient	<i>P</i>	<i>SE</i>	95% <i>CI</i>
Informal Peer Interaction (IPI)	.083**	.001	.022	.037–.120
Formal Peer interaction (FPI)	.119**	.001	.042	.070–.239
Formal Teacher Interaction (FTI)	.104**	.003	.039	.051–.205
Total Indirect Effect (<i>TIE</i>)	.306**	.001	.087	.176–.527

Note. *SE*= standard error, *CI*= confidence interval, ** $p<.01$

Differentiating the total indirect effect ($TIE = .306$, $p<.01$) into formal and informal interactions indicates that students' formal interactions with peers and teachers ($IEFPI$, $FTI=.223$, $p<.01$) are more relevant to positive perceptions of academic control than their informal interactions with peers ($IEIPI=.083$, $p<.01$).

In sum, our observation showed partial support of the second hypothesis, as only autonomy and competence need-supportive interactions significantly ($TIE=.306$, $p<.01$) predicted positive perceptions of control. Support for relatedness, indicating close and friendly bonds with peers, had no significant effect on perceptions of control.

DISCUSSION

The findings largely confirmed our assumption that need-supportive interactions would predict positive perceptions of academic control, the latter anticipating academic success.

A positive relationship between perceptions of control and academic success was also found in previous studies (Valentine et al., 2004; Martin & Marsh 2008; Collie et al., 2015). However, the support for perceptions of control is somewhat different. Previous suggestions to improve the perception of control (Haynes et al., 2009; Ruthig et al. 2008; Perry, 2003) are related to supporting an internal locus of control belief and increasing effort through interventions such as attributional retraining, classroom conversations on how to study, and by improving effective teaching methods. Our findings add the perspective that the support for academic control can also be linked to the students' involvement in daily interactions in and beyond the classroom, provided that these interactions are autonomy and competence need supportive. This finding points to two necessary conditions for increasing perceptions of academic control based on student interactions—first, students' involvement in formal interactions, and second, support of autonomy and competence needs.

Students' involvement in formal interactions with peers and teachers is shown to be the basis of need support and positive perceptions of control. The more students study together or participate in classroom discussions, the higher their chances are of experiencing needs support and academic control. This finding confirms the idea that formal interactions, as in classroom contexts, contribute to students' academic integration and persistence (Tinto, 1993; Ellis, 2000). Moreover, when the formal aspect of peer interactions was reduced, making it more informal in nature, positive effects on academic control diminished and became insignificant. This observation implies that friendly informal relationships alone are not sufficient to experience academic control; it may add to students feeling comfortable among friends in and outside the classroom, but as long as students are not involved in study-related conversations, chances are slim of improving perceptions of academic control. However, close and friendly relationships with peers are seen as beneficial by Astin (1993), and by Pascarella and Terenzini (2005), as such students are less likely to drop out, but it also points to a missed opportunity to support their development if it does not contribute to academic involvement, as argued by Kuh (1995).

One very important finding was that perception of academic control was equally, if not more effectively, supported by formal peer interactions, as by formal teacher interactions. This finding explained, in line with Hirschy and Wilson (2002), that formal teacher interactions mostly happen in a classroom context, while study-related discussions and collaborations with peers may continue outside the classroom. This further shows that need-supportive peer interactions play a significant role as predictors of perception of control. In the context of student involvement in college, the finding emphasizes the importance of distinguishing the formal and informal aspects of involvement, as it contributes to the discussion (Kuh & Love, 2000; Braxton & Lien, 2000) in what different ways social and academic integration may impact students' persistence and success.

The findings showed that the most relevant need for positive perceptions of control is students' competence support, followed by autonomy support. This finding agrees with the proposition of self-determination theory (Ryan & Deci, 2017), that when students' contribution and skills are valued in intellectual conversations, they feel confirmed in their competency and become more confident of performing well in their studies. Moreover, additional support for competence through autonomy support confirms previous findings (Skinner et al., 2008; Ratelle et al., 2007), that when students' interest and curiosity are satisfied they are more likely to experience a personal connection with the course content and thus become more intrinsically involved in learning and skill development. More such similar effects of autonomy and competence support were also seen in previous studies (Jang et al., 2016; Vansteenkiste et al., 2005).

PRACTICAL IMPLICATIONS

Our findings show the importance of autonomy and competence-supportive interactions with peers and teachers in the college environment. There are several practical implications of this finding. In the learning environment of college, where students have access to coaching and counseling programs, supervisors of these programs could help students to establish peer communities based on their social and academic interests. Institutions could further facilitate these communities with physical spaces for collaboration, workshops (e.g., on attributional retraining or learning strategies), and other activities to create an autonomy and competence-supportive environment. When support in these communities is further aligned with classroom activities, students may feel

more confident about engaging in classroom interactions with teachers and thus will gain control of their learning and academic progress.

In classroom settings, teachers could further improve students' academic experience by using need-supportive language. For example, teachers could regularly ask students' perspective on matters, recognize their knowledge and skills, and encourage further development. Furthermore, when assignments and learning activities are diversified in ways that create autonomy-supportive learning contexts, students are more likely to perceive learning activities as being personally relevant and aligned with academic goals. One example of an autonomy-supportive community connecting students with different skills across all academic years, which supported social and academic involvement, was the Diversity of Talent Community of The Hague University of applied sciences in The Netherlands.

LIMITATIONS

First, this study was conducted in The Netherlands among non-residential colleges, where students spend limited time together on campus. Need-supportive interactions of students in residential colleges may show different relationships between formal and informal interactions, which may affect the support of the psychological needs and perceptions of control differently.

Second, this study did not examine differences in gender or ethnicity, because the subsample sizes were considered too small to conduct path analysis (Kline, 2011). The findings should, therefore, be interpreted with caution when generalizing to gender or ethnicity. Hence, there is good reason to differentiate between these subgroups in a follow-up study, as completion rates within six years from the start—of undergraduates at public colleges in 2010— showed differences up to 20% between different races in the USA (National Center for Education Statistics [NCES], 2019) and 15% between the majority and minority students in The Netherlands (Central Bureau for Statistics [CBS], 2018).

CONCLUSION

Students' perception of academic control appeared to be a significant predictor for academic success. Therefore, understanding how to improve perceptions of control is essential for a successful college career. This study explored the support for perceptions of control through students' involvement in formal and informal interactions in college and support of the psychological needs: relatedness, autonomy, and competence.

Contributing to previous insights, we found that students' involvement in intellectual conversations with peers and teachers (in and outside the classroom) is most likely to support perceptions of academic control when the content of these conversations satisfies students' autonomy and competence needs. In contrast, informal interactions that establish friendly relationships with peers (or teachers), but do not contribute to intellectual conversations, are less likely to have any effect on perceptions of control.

Declaration of Conflicting Interests

The author declared no conflicts of interest related to the research, authorship, and/or publication of this article.

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