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Article

Self-efficacy, Motivation and Academic Satisfaction: The Moderating Role of the Number of Friends at University

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ABSTRACT

Background: Academic satisfaction (AS) is a key marker of educational success at university. It is therefore extremely important to investigate any factors that may enhance AS. Drawing on social cognitive theory, Lent's model of life satisfaction, and self-determination theory, the present study examined the roles of academic self-efficacy (ASE) and type of motivation for attending university in AS, while controlling for sex and course year. More specifically, the study investigated whether friendships at university moderated the relationship between AS and ASE, and between AS and the various kinds of motivation for going to university. **Method:** A survey was completed by 431 Italian university students. Five moderation regression analyses were run. **Results:** Having friends at university affected the relationship between amotivation and AS and between extrinsic motivation and AS: the more students were motivated or had low extrinsic motivation, the more satisfied they were, if they had a high number of friends at university. Conversely, if students lacked motivation or had high extrinsic motivation, they tended to be less satisfied, regardless of how many friends they had at university. **Conclusions:** A large number of friends at university maximizes and amplifies the effect of being self-determined on AS. We discuss the educational implications of these findings.

Autoeficacia, Motivación y Satisfacción Académica: el Rol Moderador del Número de Amigos en la Universidad

Palabras clave:
Satisfacción académica
Motivaciones
Amistades en la universidad
Autoeficacia
Teoría de la autodeterminación

RESUMEN

Antecedentes: La satisfacción académica (SA) es un índice importante del éxito educativo en la universidad. Es importante estudiar qué factores mejoran la AS. Basándose en la teoría cognitiva social, el modelo de Lent y la teoría de la autodeterminación, el presente estudio tuvo como objetivo investigar el papel de la autoeficacia académica (ASE) y las motivaciones para asistir a la universidad en el AS, controlando por sexo y año de curso. Este estudio investigó el efecto moderador de las amistades en la universidad en la relación entre ASE y AS, y entre diferentes motivaciones y AS. **Método:** 431 estudiantes universitarios italianos completaron una encuesta. Se realizaron cinco análisis de regresión de moderación. **Resultados:** Tener amigos en la universidad condicionó la relación entre desmotivación y SA y entre motivación extrínseca y SA: cuanto más motivados están los estudiantes o tienen baja motivación extrínseca, más satisfechos están si tienen muchos amigos en la universidad; por el contrario, si los estudiantes están desmotivados o tienen una motivación extrínseca alta, están menos satisfechos independientemente del número de amigos en la universidad. **Conclusiones:** Un alto número de amigos en la universidad amplifica la importancia de ser autodeterminado en SA. Se discuten las implicaciones educativas.

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Students' academic satisfaction (AS) has recently been attracting growing interest in educational research. According to the emerging view and paradigm of higher education, tertiary education should be more student-oriented and attentive to students' educational needs (Urquijo & Extremera, 2017). Many studies have focused on university students' satisfaction, especially in relation to their academic experience (e.g., Ojeda et al., 2011).

AS may be defined as a type of satisfaction judgment about a specific domain of life such as one's university studies. It is viewed as a multidimensional construct that encompasses satisfaction with teaching quality, learner engagement, learning resources, student support, and skill development (e.g., Bobe & Cooper, 2017). It is therefore different from other kinds of satisfaction judgement pertaining to different domains (e.g., one's life, work, etc.). In essence, it may be thought of as a cognitive judgment by students concerning how positively they evaluate their university learning experiences (Kuo et al., 2014).

AS significantly contributes to explaining perceived academic success: multiple studies have shown that AS facilitates learning as well as academic and work performance (Ojeda et al., 2011; Park, 2011). Judging one's own AS is a complex process involving multiple variables. Lent (2004, 2007) proposed one of the most frequently-cited theoretical models of general life satisfaction, which may also be used to explain AS. Life satisfaction is assumed to be indirectly influenced by self-efficacy, expectations about outcomes, and the environmental support and resources available to individuals in their core life domains. It follows that AS may enhance overall life satisfaction for university students. Lent and Brown (2008) extended their life satisfaction framework to specific contexts of adjustment in educational settings, and conceptualized domain-relevant satisfaction as an aspect of individual school and work adjustment.

Several cross-sectional studies with college students in different years of their university courses (e.g., Lent et al., 2005) and some longitudinal studies (Lent et al., 2009; Singley et al., 2010) have attempted to identify predictors of AS among university students within the framework of Lent's evolving model. Sheu et al. (2016) tested an amended version of the model by Lent and Brown (2008), showing that academic support, self-efficacy, expectations surrounding outcomes, and goal progress can all mediate the relationship between personality traits and AS or life satisfaction.

To date, studies informed by Lent's model have focused on how AS may be enhanced by self-efficacy beliefs, by environmental support and, at the motivational level, by expectations about outcomes and progress in goal-directed activities. In the present study, we set out to explore how AS may be influenced by academic self-efficacy and specific motivations for attending university, and whether the interaction between these variables is moderated by how many friends students have at university.

Self-efficacy may be defined as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391). In educational settings, academic self-efficacy (ASE) plays a crucial role and is defined as learners' judgments about their ability to successfully attain educational goals (Elias & MacDonald, 2007). In the context of ASE, Bandura et al. (1996) focused on self-efficacy of self-regulated learning, which is the perception that one can successfully deploy self-regulation strategies during study. This is a particularly important construct, especially from adolescence onwards (Cattelino et al., 2019).

Self-efficacious university students perform better academically because they monitor and self-regulate their impulses and persist in the face of difficulty (Komarraju & Nadler, 2013). Higher levels of ASE positively impact goal-directed, self-regulatory behaviors (Cattelino et al., 2019). ASE also leads to improved grades, both directly and indirectly, because self-efficacious students tend to set higher goals for their academic achievement (Pajares, 2002). Research on Lent's model has further confirmed the key role of self-efficacy as a predictor of AS (Lent et al., 2005). Ojeda et al. (2011) identified positive correlations between ASE, AS and life satisfaction, and between ASE, college outcome expectations, academic goal progress, AS and life satisfaction. A recent study found that the strongest predictor of AS was ASE, and specifically self-efficacy in self-regulated learning (Morelli et al., 2021).

According to self-determination theory (SDT; Ryan & Deci, 2000), students' reasons for attending university may be classified as a form of academic motivation. According to SDT, motivation is undergirded by innate psychological needs, primarily the need for relatedness, competence and autonomy (Adams et al, 2017; Deci & Ryan, 2008; Ryan & Deci, 2017). There are possible connections between the three needs postulated in SDT and certain components of Lent's model of life satisfaction (specifically, competence may be seen as overlapping with self-efficacy, relatedness as including environmental support from others and autonomy as encompassing outcome expectations and progress in goal-directed activities). The need for autonomy is the core component of SDT (Joussemet et al., 2008) and is defined as the will to organize one's own experience and behavior and to act in keeping with an integrated sense of self (Deci & Ryan, 2000).

There are different levels of academic motivation, which vary in terms of their relative degree of autonomy, and which together may be seen as forming a self-determination continuum ranging from amotivation to extrinsic motivation to intrinsic motivation (Deci & Ryan, 2000, 2008). Amotivation is the lowest level of autonomy and characterizes individuals who are neither intrinsically nor extrinsically motivated, and who thus lack intentionality, self-regulation and a sense of personal causation. Extrinsic motivation is present when behavior is regulated by externally imposed rewards or punishments. Introjected motivation is based on internal reward/punishment, such as ego enhancement, or contingent self-esteem, guilt or anxiety. Identified motivation is a more autonomous or self-determined motivation and characterizes individuals who have adopted the values that inform their behaviors. At the high end of the continuum is intrinsic motivation, the most self-determined form, which leads individuals to act out of interest and with a view to satisfying their need for competence and autonomy (van Herpen et al., 2017). One of the most widely-used scales for evaluating motivation in academic contexts from an STD perspective is the Academic Self-Regulation Questionnaire (Ryan & Connell, 1989), which assesses those five styles of motivational regulation.

Trevino and DeFreitas (2014) reported that many studies with college students have documented the relationship between intrinsic motivation and achievement outcomes. Simons et al. (2004) found that, in keeping with SDT, students whose behavior is internally regulated display greater interest in their studies,

persist longer, draw on deeper-level learning strategies and achieve better academically than students who are externally controlled. Guiffrida et al. (2013) showed that intrinsic motivation was associated with intention to persist and grade point average (GPA). Morelli et al. (2022) found that university students with a stronger intention to drop out displayed high amotivation and external and introjected motivation and low identified and intrinsic motivation.

However, while many studies have noted the influence of students' intrinsic motivation on academic achievement, relatively few have investigated its effect on AS. These include Garriott et al. (2015), who tested the social cognitive model of well-being developed by Lent (2004), identifying a three-way interaction effect between AS, intrinsic academic motivation, and first-generation college student status in moderating life satisfaction. Soria and Stebleton (2013) found that AS and sense of belonging were negatively correlated with extrinsic motivation and positively correlated with intrinsic motivation. The present study contributes to filling the current gap in this line of inquiry by bringing a self-determination theory perspective to bear on students' reasons for attending university to investigate how motivation can affect AS.

Having social relationships with university peers is a protective factor for academic success (Kutsyuruba et al., 2015). Tinto (1998) and Pascarella and Terenzini (2005) highlighted the key contribution of academic and social integration to positive student functioning. Several studies have concluded that having friends at university is associated with positive academic functioning and academic success (Abdullah et al., 2014; DeBerard et al., 2004; Mattanah et al., 2012; Yasin & Dzulkifli, 2011). These findings apply strongly in Italy, where the academic system requires students to attend class with the same group of peers for the entire day and for the entire three- or five-year duration of their degree course (Bonino & Cattelino, 2012). Two recent studies showed that having friends at university plays a protective role in both academic satisfaction and university persistence (Morelli et al., 2021, 2022). College students with many social relationships at university feel less lonely and achieve more academically because they can ask for help when they encounter difficulties (Mattanah et al., 2012). Students with more friends at university also report feeling more satisfied, and socially connected (Hendrickson et al., 2011).

Bianchi et al. (2021) suggested that peer acceptance and positive relationships with classmates are inversely related with intention to drop out, and that this is the case from preadolescence onwards. Cattelino et al. (2021) found that having more relationships with classmates can protect high-school students with low self-efficacy due to poor grades from developing depression. In addition, as discussed by de la Fuente et al. (2022), interpersonal contexts offer different levels of external regulation and may be classified as: highly externally regulatory, external de-regulatory or non-regulating, dysregulating or external dysfunctional. Accordingly, having a significant number of friends at university is a key social component of external regulation, which can potentially have a regulatory, non-regulatory or deregulatory value. Another recent study found that having more friends at college moderates the relationship between multiple kinds of motivation to attend university and the intention to drop out (Morelli et al., 2022).

To the best of our knowledge, although having more friends enhances students' well-being and university persistence, no studies have considered the combined effect of college friendships, ASE, and different kinds of motivation on AS. Hence, the aim of the present study was to address this gap in the existing research.

In summary, as suggested by Lent (2004), influences on AS need to be investigated from a multivariate perspective that takes into account the complex interaction of multiple protective and risk factors. The theoretical frameworks of social-cognitive theory (Bandura, 1997) and Lent's model of life satisfaction (Lent, 2007) suggest that expectations of self-efficacy—as a predictor of self-regulation in terms of monitoring progress on goal-directed activities—will influence academic satisfaction. Furthermore, SDT (Deci & Ryan, 2008, 2017) posits that the need for competence, autonomy and relatedness predict intrinsic motivation. Drawing on these theoretical models, the present study investigated the influence of both ASE and different motivations for attending university on AS, while controlling for any effects of students' biological sex and current course year. We expected that higher ASE (Lent, 2004; Sheu et al., 2016) and intrinsic motivation (as well as less amotivation, and lower external and introjected motivation) would predict higher AS (Garriott et al., 2015; Soria & Stebleton, 2013). Biological sex and course year were added as covariates because previous studies found that AS can vary as a function of these factors: women usually report greater academic satisfaction than men (Balkis et al., 2017), while postgraduate students display different patterns of AS to undergraduate students due to differences in maturity, academic ability, experience and expectations (Muijs & Bokhove, 2017).

In addition, as recommended by Garriott et al. (2015), the present study included an original analysis of both additive and multiplicative effects among the identified variables, with a view to uncovering potential interactions between them that could impact AS. Specifically, we investigated whether the number of students' friends at university had a moderating effect on the relationship between ASE and AS, and on the relationship between each kind of motivation (amotivation, external, introjected, identified, and intrinsic) and AS. According to SDT (Ryan & Deci, 2017), having friends can protect against dissatisfaction in students with low levels of intrinsic motivation and self-efficacy. This is particularly true during adolescence and young adulthood, which are stages of development when friendships play a major role in individual wellbeing and choices (Arnett, 2015; Bagwell & Bukowski, 2018). Furthermore, investigating the possible moderating role of friendships is also in keeping with the lifespan development model proposed by Hendry and Kloep (2002). According to this model, life challenges are tasks or conditions that prompt people to activate their resources: if individuals lack personal resources (in this case, if they have low internal motivation and low self-efficacy), additional social resources (in this case, having more friends at university) can help them to address and overcome challenges, thereby reducing their risk of ending up unsatisfied with their educational experience.

We drew on the same theoretical framework and data analysis strategy adopted in a recent study by Morelli et al. (2022)—which showed that having a higher number of friends at university protects students with low and external motivation from dropping out—and in light of the previously documented role of positive relationships at university in enhancing AS and academic adjustment (Cattelino et al., 2021; Lent et al., 2009; Lidy & Kahn, 2006; Mattanah et al., 2012; Morelli et al., 2021, 2022), predicting that having a higher number of friends at university would enhance AS in students with low ASE and high amotivation and external motivation. In other

words, we expected that the positive relationship between ASE and AS would be further reinforced by having a larger number of friends at university. Conversely, we hypothesized that the negative relationships between amotivation and AS, and between external motivation and AS would attenuated by having more friends.

Method

Participants

Participants were 431 Italian university students (M = 23.06 years; SD = 5.55; age range = 18-59), of whom 362 (84%) were women. To be included in the study, the respondents were required to be currently enrolled on a degree course at a public university in Northern Italy (55% of the sample) or Central Italy (45%). Ninety-two students (21.3%) were attending the first year of their chosen university course, 113 (26.2%) their second, 103 (23.9%) their third, 43 (10%) their fourth and 41 (9.5%) their fifth, while 20 (4.6%) were taking one year longer than usual to complete their degree course and 19 (4.4%) were taking more than one year longer than usual. Most of the students (75.9%) stated that they came from a medium socio-economic background, while with respect to their own socio-economic status, 123 students (28.5%) reported a low SES and 277 (64.3%) a medium level.

Instruments

Socio-Demographic Information

Participants were asked to report their biological sex, age, nationality, course year, the type of course and university they were attending, their family and personal socio-economic status, and their occupational status.

Academic Self-Efficacy (ASE)

The participants were asked to complete a version of the Perceived Efficacy Scale for self-regulated learning (Italian validation by Bandura et al., 1996) that had been adapted for university students with a view to assessing their perceived ASE. This scale evaluates students' perceptions concerning their ability to organize and plan their study activities, to ask for help when they have difficulty studying, and to choose suitable places to study. It comprises 11 items rated on a 5-point Likert scale ranging from 1 = Not at all capable to 5 = Totally capable. The scale displayed good reliability, producing a Cronbach's alpha coefficient of .84.

Friendships at University

Following the procedure developed by Morelli et al. (2021, 2022), a single item was used to quantify the respondents' circles of university friends. A similar one-item measure has proved salient and informative in previous studies with adolescents and young adults (Jessor, 2016; Morelli et al., 2021, 2022). More specifically, the participants were asked to pick the rating that best described their number of university friends (not classmates) on a 5-point Likert scale ranging from *1 = None to 5 = 6 or more friends*. This particular variable was assessed because intimacy and positive support are particularly characteristic of close social relationships such as friendships (Rubin et al., 2006).

Motivation for Attending University

The Academic Self-Regulation Questionnaire (A-SRQ; Ryan & Connell, 1989; Italian validation by Alivernini & Lucidi, 2008; Girelli et al., 2018) was administered to assess the participants' motivations for choosing to attend university. Participants were asked to describe why they were attending university by rating 20 items on a 5-point Likert scale ranging from *1 = Does not correspond at all to 5* = Corresponds exactly. The scale evaluates five types of motivation in relation to the decision to undertake a university course: amotivation (4 items; Cronbach's alpha of .77), external (4 items; Cronbach's alpha of .85), introjected (4 items; Cronbach's alpha of .75), identified (4 items; Cronbach's alpha of .91) and intrinsic (4 items; Cronbach's alpha of .85).

Academic Satisfaction (AS)

Five items used in a previous study by Morelli et al. (2021) were used to measure the multidimensional construct of satisfaction in relation to the overall university experience, university services for students, relationships with other students and academic staff, and learning, as defined by Bobe and Cooper (2017). Participants rated each item on a 10-point Likert scale from *1 = Totally unsatisfied to 10 = Totally satisfied* (Cronbach's alpha of .80).

Procedure

Participants were recruited from a range of degree programs at several different Italian universities, as described in the Participants section. Members of university teaching staff and heads of university departments sent an email to students inviting them to take part in an online survey. In accordance with the Declaration of Helsinki, each student provided informed consent on the first page of the online instrument, by clicking on the tab "Yes, I agree to participate in the study". The study was approved by the Ethics committee of Sapienza University of Rome.

Data Analysis

The study was cross-sectional in design. Five moderation regression analyses were conducted to test the moderation effects of number of friends at university on the relation between AS and ASE , and between AS and each kind of motivation for attending university, while controlling for the effects of two other variables previously found to play a role in academic satisfaction, namely students' biological sex and course year (Balkis et al., 2017; Muijs & Bokhove, 2017). Specifically, in each regression analysis, AS was regressed onto biological sex, course year, ASE, number of friends at university, a specific kind of motivation, and the interaction effects of ASE*number of friends and the investigated motivation*number of friends. The data sets for all variables were converted into z-scores for standardization purposes (Aiken & West, 1991). Slope analyses were run in order to interpret the direction of the interactions.

Results

Moderation Regression Analyses

The first moderation regression analysis tested the moderation effect of number of friends at university on the relationships between AS and ASE and between AS and amotivation, while controlling for students' biological sex and year. The model was significant, accounting for 25.1% of the variance, R = .50, p < .001. ASE, number of friends at university, and amotivation were significant predictors of AS. Moreover, the interaction amotivation*number of friends at university was significant. Full statistics for the model are reported in Table 1.

Table 1
Moderation Regression Analysis: Amotivation

	Academic Satisfaction	
Predictor	***ΔR²***	***B***
Biological sex		-.07
Year of course		.01
ASE		.32***
Number of friends		.23***
Amotivation		-.18***
ASE*Number of friends		-.03
Amotivation* Number of friends		-.08*
Total R2	.25***	

Note: ***p < .001; **p < .01; *p < .05. Standardized regression coefficients are reported.

To interpret the direction of the interaction, a simple slope analysis was conducted by plotting the predicted values of AS as a function of amotivation and two different levels of the moderator variable (i.e., number of friends at university). As suggested by Aiken & West (1991) and previously implemented by Morelli et al. (2022), in slope analyses, when the moderator is a continuous variable, a low level of the moderator (in this case having a small number of friends) is usually computed as one standard deviation below the mean (-1 SD), and a high level of the moderator (in this case having a high number of friends) as one standard deviation above the mean (+1 SD). In the present study, a low level was taken to be less than two friends, while a high level was taken to be over six friends. The slope analysis showed that when students reported having a small number of friends at university, there was a negative relationship between amotivation and AS, b = -.10, t = - 2.18, p = .03. When they reported a large number of friends at university, the negative relationship between amotivation and AS was even stronger, b = -.25, t = -4.06, p = .0001. Therefore, students with a larger number of friends at university are more satisfied in general with their university experience, but in this case, the more they are also motivated (i.e., the less they are affected by amotivation) the more they are satisfied. Conversely, if the students are not motivated (i.e., strong amotivation), they are less satisfied regardless of the number of friends they have at university (Figure 1).

The second moderation regression analysis tested the moderation effect of number of friends at university on the relationship between AS and ASE and between AS and external motivation, while controlling for students' biological sex and year. The model was significant, accounting for 24.3% of the variance, R = .49, p < .001. ASE, number of friends at university, and external motivation were significant predictors of AS. Also, the interaction term external motivation*number of friends at university was significant. Full statistics for the final model are reported in Table 2.

To interpret the direction of the interaction, a simple slope analysis was conducted by plotting the predicted values of AS as a function of external motivation and two different levels of the moderator (i.e., number of friends in the university context), which were computed as described for the first model.

When students reported having a small number of friends at university, there was a negative but non-significant relationship between external motivation and AS, b = -.04, t = - 0.83, p = .41. When they reported a large number of friends, there was a significant relationship between external motivation and AS, b = -.22, t = -3.46, p < .001. Therefore, students with a larger number of friends at university are generally more satisfied with their university experience, but the less they are externally motivated (i.e., report low levels of external motivation), the more they are satisfied (Figure 2).

In the remaining three moderation regression analyses in which we respectively tested the moderation effect of number of friends at university on the relationships between identified motivation and AS, introjected motivation and AS, and intrinsic motivation and AS, no significant interaction effects were found (Tables 3, 4, and 5).

Table 2
Moderation Regression Analysis: External Motivation

	Academic Satisfaction	
Predictor	***ΔR²***	***B***
Biological sex		-.06
Year of course		.02
Academic self-efficacy		.34***
Number of friends		.23***
External motivation		-.14**
Academic self-efficacy*number of friends		-.02
External motivation* number of friends		-.10*
Total R^2	.24***	

Note: ***p < .001; **p < .01; *p < .05. Standardized regression coefficients are reported.

Table 3
Moderation Regression Analysis: Identified Motivation

	Academic Satisfaction	
Predictor	***ΔR²***	***B***
Biological sex		-.06
Year of course		.03
Academic self-efficacy		.27***
Number of friends		.24***
Identified motivation		.23***
Academic self-efficacy*Number of friends		-.03
Identified motivation*Number of friends		.06
Total R^2	.26***	

Note: ***p < .001; **p < .01; *p < .05. Standardized regression coefficients are reported.

Figure 1
Slope Analysis for Amotivation

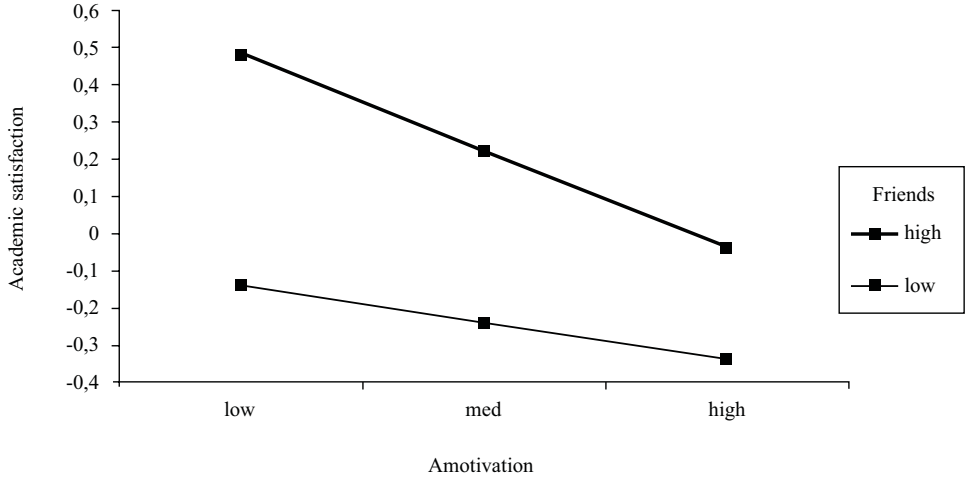

Figure 2
Slope Analysis for External Motivation

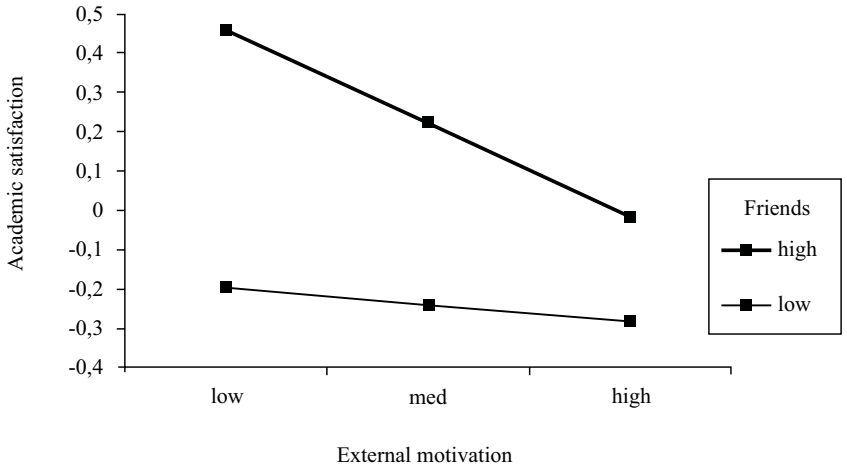

Table 4
Moderation Regression Analysis: Introjected Motivation

	Academic Satisfaction	
Predictor	***ΔR²***	***B***
Biological sex		-.06
Year of course		.02
Academic self-efficacy		.36***
Number of friends		.24***
Introjected motivation		.002
Academic self-efficacy*Number of friends		-.01
Introjected motivation*Number of friends		-.04
Total R²	.23***	

Note: ***p < .001; **p < .01; *p < .05. Standardized regression coefficients are reported.

Table 5
Moderation Regression Analysis: Intrinsic Motivation

	Academic Satisfaction	
Predictor	***ΔR²***	***B***
Biological sex		-.06
Year of course		.02
Academic self-efficacy		.25***
Number of friends		.20***
Intrinsic motivation		.30***
Academic self-efficacy*Number of friends		-.04
Intrinsic motivation*Number of friends		.05
Total R²	.29***	

Note: ***p< .001; **p < .01; *p < .05. Standardized regression coefficients are reported.

Discussion

The fourth of the Sustainable Development Goals (SDGs), also known as the Global Goals, adopted by the United Nations in 2015, concerns quality education and reaffirms the principle that "education is one of the most powerful and proven vehicles for sustainable development". AS is one of the most important markers of educational success, together with number of exams passed and GPA (Morelli et al., 2021). It is also a key factor in young people's current well-being and future choices. For example, students with stronger involvement and AS display greater university persistence and success (Berger & Milem, 1999; Morelli et al., 2022), with knock-on effects on their future lives and work. Despite increasing research focus on AS (Lent, 2004) in light of its role in academic performance and retention, few studies—especially in the Italian context—have investigated the drivers of AS from a multivariate perspective, attempting to unpack the complex interactions among multiple protective and risk factors.

The outcomes of this study partially redress this gap in the literature, confirming that ASE, number of friends at university, and intrinsic and identified motivations (i.e., the highest levels of self-determination) all foster AS, whereas amotivation and external motivation (i.e., the lowest levels of self-determination) depress AS. These results are consistent with social cognitive theory (Bandura, 1997), SDT (Deci & Ryan, 2000) and the social cognitive model of well-being proposed by Lent (2004), which all suggest that individuals who are high in self-efficacy and intrinsic motivation are generally more satisfied with their lives. In the specific domain investigated here, students who perceived themselves as capable of managing the challenges and requirements of their university course were also more satisfied with their academic experience and trajectory. This may be because perceiving oneself as able to deal effectively with tasks and challenges fosters expectations of successful outcomes, reduces anxiety, and enhances feelings of well-being and satisfaction (Bandura, 1997). Hence intrinsic and identified motivation for attending college also boost AS: this observation reflects the need for autonomy that is the core component of SDT. Students with strong identified and intrinsic motivation are driven by their own interest (Deci & Ryan, 2000). These kinds of motivation generate feelings of competence and autonomy (van Herpen et al., 2017) which in turn promote AS. On the contrary, amotivation (i.e., the lowest level of autonomy that characterizes individuals who are neither intrinsically nor extrinsically motivated) is associated with low levels of AS. Amotivated and externally motivated students choose to attend university because they believe they have no other option or because of external constraints imposed on them, for example, by family members (Deci & Ryan, 2000). They do not invest in their academic career and their lack of engagement means that their university experience fails to satisfy them.

The added value of this study compared to previous research is its investigation of potential moderation effects of number of friends at university on the relationship between AS and ASE, and between AS and different kinds of motivation. Both ASE and motivation may be conceptualized as cognitive regulation processes. However, satisfaction with a complex experience such as university is also driven by social and emotional factors (Lent et al., 2005). In this study, we chose to analyze the role of how many friends students had at university. Other studies have examined the role of social support (Lent et al., 2009; Mattanah et al., 2012), however, friendships involve not only support but also mutuality, self-disclosure and intimacy (Rubin et al., 2006). Our findings suggest that students with more friends are more satisfied with their university experience, but also that having a higher number of friends moderates the risk of low AS when students display strong amotivation and external motivation. In other words, having many friends at university maximizes and amplifies the effect of being self-determined on AS. One interpretation of these results is that AS appears to be related to the psychological need for competence (which is related to self-efficacy), autonomy (which is related to intrinsic motivation) and relatedness (which is associated with having friends). For young people, all these needs are crucial to their educational experience and play an additive role. However, in higher risk scenarios dominated by amotivation and extrinsic motivation, having friends at college appears to enhance personal AS via a multiplicative effect. This dynamic peaks during adolescence and young adulthood, life stages when having friends and positive relationships with peers plays a key role in perceived well-being and general life satisfaction (Arnett, 2000; Bonino & Cattelino, 2012).

In the present study, we did not find the number of students' university friends to mediate the relationship between their ASE and AS. Future longitudinal studies could explore a hypothetical alternative model whereby number of friends might enhance ASE, given that vicarious experience is one of the sources of academic self-efficacy, with knock-on benefits for AS.

Some limitations of this study need be acknowledged. First, the participants were not a representative sample of the general population of university students. However, the size and directions of the identified relationships were theoretically justifiable and empirically similar to those previously reported in the literature. Hence, the sample's lack of representativeness is not likely have significantly undermined the research outcomes. Another weakness is that the data were cross-sectional, preventing the inference of causal relationships among the study variables. Future longitudinal studies should be conducted to improve our understanding of how protective and risk factors for AS may evolve in the course of development. Finally, adding students' biological sex and year as covariates in the models we tested does not mean that the psychosocial factor was minimized. In any case, we tested the potential three-way interactions with both biological sex and course year but found no significant effects.

Despite these limitations, the present findings are of interest because they confirm how important it is to study AS as a marker of academic success alongside markers of performance (e.g., the GPA). They also extend our knowledge about educational experience and can inform the design of effective prevention programs and interventions aimed at promoting AS. Our results may also represent a starting point for a more in-depth investigation of friendships, especially as a source of support, but also as a source of vicarious experience and extrinsic motivation.

From an applied perspective, universities should work to foster students' perceived self-efficacy, ability to make independent choices and social relationships. Potential strategies could include: making students aware of the learning objectives they have attained; presenting them with appropriate challenges; building a certain amount of choice into degree programs (in

relation to both content and methods of assessment); offering more opportunities for students to meet and work together; organizing leisure activities. Encouraging study groups among students should be a focus for teachers. Such groups can bring dual benefits. First, discussion with others and the reinforcing effect of peers' academic success act to enhance both academic satisfaction and academic self-efficacy. Second, studying with a group can protect students from the feelings of isolation and depression that are commonly experienced during the university years. In addition, peer tutoring (Da Re & Riva, 2018) can be a particularly effective means of helping students to deal with difficulties, boosting their self-perceived ability to organize and manage the ordinary challenges of university. By enhancing both ASE and social relationships at university and thereby fostering AS, peer tutoring could significantly reduce academic failure (Morelli et al., 2022). Furthermore, universities should focus on encouraging social relationships among students beginning in first year: welcome ceremonies and recreational sports and cultural activities would help students to build relationships with peers and to interact with others outside the classroom. Finally, the presence of common study areas on campus is essential but in Italy such facilities are still scarce.

These strategies would complement each other, ensuring the additive and multiplicative effects that emerged as significant in this study. Therefore, it is essential that support to students is not just offered at the individual level, but also at the collective and relational level, via collaborative learning environments that in turn will foster friendships, as well as work methods based on peer tutoring, cooperative learning and knowledge building. The sum of these approaches will be the creation of interpersonal contexts that de la Fuente et al. (2017, 2022) have defined as highly externally regulatory, as opposed to dysregulating or external dysfunctional. Such contexts directly support study and therefore AS, while simultaneously enhancing intrinsic motivation via internalization processes (Cattelino et al., 2019), ASE via vicarious experience, and academic engagement (Zava et al., 2022), and thus indirectly contributing once more to improved AS.

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