



The role of mental toughness and academic satisfaction in suppressing first-year students' intentions to dropout of university

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Abstract

The urgent need to reduce the substantial and persistent incidence of higher education dropout, especially during the first academic year, calls for further research to identify the core predictors of students' withdrawal intentions and actual behaviors. Specifically, more research is needed to assess whether and how students' personal resources and academic attitudes interplay in shaping this phenomenon. This study addresses these questions by examining the unexplored joint role of students' mental toughness and academic satisfaction in counteracting their intention to leave university at the end of the first year. Data from a sample of 187 first-year undergraduates at a non-residential public university, collected at three measurement points, supported the validity of both variables in predicting dropout intentions, after controlling for the effects of academic performance. The results also indicated that the effect of mental toughness in suppressing dropout intentions does not occur when students are dissatisfied with the university. The main implications of these findings are presented and discussed.

Keywords Academic attitudes · College dropout · Student retention · Tertiary education · Moderation

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Introduction

The pervasive high incidence of students dropping out of university has been a major concern in higher education for over half a century (Ibsen & Rosholm, 2024). In the OECD (Organization for Economic Co-operation and Development) countries, approximately 23% of students end up leaving their studies, i.e., quitting their tertiary education, before graduation (OECD, 2022). This phenomenon is even more pronounced among first-year students, whose dropout rates can reach as high as 45% (Bargmann et al., 2022; Bülke et al., 2022; OECD, 2017).

This scenario makes the prevention and mitigation of this negative and challenging phenomenon an urgent matter, particularly during the early stages of the academic trajectory. It has multiple detrimental effects, simultaneously impacting the students who withdraw, their universities, and society as a whole (Dewberry & Jackson, 2018; Ibsen & Rosholm, 2024). Beyond the negative psychological effects of not completing their studies, linked to self-doubt and feelings of personal inadequacy, students who dropout may be left with a misguided personal investment, loans to repay, and less favorable career and income prospects (Baalmann et al., 2024; OECD, 2024). For universities, high dropout rates inevitably undermine institutional performance and income by allocating resources to students who eventually dropout, rather than directing them to those who persevere and benefit fully from academic opportunities (Bargmann et al., 2022; Larsen et al., 2013). At a broader level, significant dropout rates shrink the supply of graduates and may contribute to talent shortages, ultimately constraining society's economic growth, social mobility, and equality (Dewberry & Jackson, 2018; Ibsen & Rosholm, 2024).

Several theoretical models, initially rooted in a sociological approach (Tinto, 1975, 2006) and subsequently developed through contemporary psychological and economic perspectives (Aina et al., 2018; Bean, 1983; Dewberry & Jackson, 2018), have led to a growing recognition that dropout is the result of an evolving and multidetermined process, which is immediately preceded by the development of a congruent withdrawal intention. Consistently, recent research has further modeled this process as a sequential decision-making process that evolves from an early perception of non-fit with studying, whereby students experience a non-adjustment between themselves and the university's learning content and context (Bülke et al., 2022). This initial sense of non-academic fit tends to trigger thoughts of quitting and favor the students' deliberation on the implied costs and expected returns of continuing the course, relative to alternatives such as pursuing non-university programs or attainable career paths. The degree of contrast between a lack of academic fit and the feasibility of these alternatives triggers the formation of the intention to leave university, consequently increasing the likelihood of taking that action (see Bülke et al., 2022). Hence, unlike dropout behavior, which is largely irreversible once completed, this prior intention and early warning sign of dropout can be modified through timely and targeted university interventions (Bülke et al., 2022; Schnettler et al., 2020).

Due to its proximal impact on dropout behaviors, concomitant to its leverage for intervention, the intention to dropout has been adopted as a key criterion in research aimed at mapping the core antecedents of university dropout (Aina et al., 2018; Baalmann et al., 2024; Bülke et al., 2022; Dewberry & Jackson, 2018). Cumulative evidence indicates that students' intentions to withdraw and their subsequent behavior of leaving university are shaped by various pre- and post-entry factors. Those concerning

the pre-entry phase include variables regarding students' socio-demographic background (e.g., gender, age, socioeconomic status); individual differences in aptitude and personality; and level of previous schooling achievement (Aina et al., 2018; Ibsen & Rosholm, 2024; Larsen, 2013).

Despite the value of these pre-entry factors in signaling students who may be a priori more vulnerable or at higher risk of dropping out, the literature has increasingly shifted towards the examination of more proximal and malleable post-entry factors, as these are amenable to change through institutional interventions (Ibsen and Rosholm, 2024; Schnettler et al., 2020). At this level, meta-analytic research has supported the inclusion of academic-related motivation and skills, social support (e.g., from professors, peers, family and friends) and first-year college performance among the most accurate predictors of this phenomenon (Robbins et al., 2004; Westrick et al., 2021). More recent theoretical approaches reiterate the importance of these factors as key enablers of student success and retention, such as the study demands–resources theory (SD–R, Bakker & Mostert, 2024). In particular, students' personal resources for managing core academic responsibilities have been proposed as crucial to fostering academic motivation and alleviating the strain of high study demands. Accordingly, students with more personal resources (e.g., self-efficacy, optimism) tend to act more proactively and extend their study resources (e.g., social support, constructive feedback) after entering university, thereby enhancing their academic engagement, well-being and success (Bakker et al., 2015; Robayo-Tamayo et al., 2020). However, as noted by Bakker and Mostert (2024), more research is needed to empirically validate the role of personal resources in suppressing dropout intentions.

The current study examines the impact of students' personal resources, operationalized via the construct of mental toughness (MT, Gucciardi, 2020; Gucciardi et al., 2015), in counteracting the development of dropout intention at the end of the first academic year. Moreover, it further tests the effect of students' satisfaction with the university on dropout intention, as well as whether this attitude interacts with MT in preventing this withdrawal intention. By pursuing these research objectives, it aims to make two main contributions to the literature.

First, it aligns with the SD–R theory (Bakker & Mostert, 2024) to test the assumption that personal psychological resources, captured by students' MT, prevent the formation of dropout intentions by enabling them to effectively master academic demands. According to Gucciardi's (2017, p. 18) conceptualization, MT refers to a state-like set of psychological resources that are "purposeful, flexible and efficient in nature for the enactment and maintenance of goal-directed pursuits," even in stressful and challenging circumstances. Since its emergence in sport and exercise, MT has been increasingly recognized as an important driver of optimal athletic performance and overall success, particularly in the last two decades (see Hsieh et al., 2023; Rodrigues et al., 2023). Similarly, some reviews suggest that MT may have this status in other performance contexts, such as work and academic settings, where relevant empirical evidence is significantly more limited (Gucciardi et al., 2015; Lin et al., 2017; McGeown et al., 2016). Consistently, preliminary research supports the promising role of MT in higher education, showing that students who are more mentally robust tend to perform better (Gucciardi et al., 2015; St Clair-Thompson & Devine, 2023) and demonstrate higher levels of academic adjustment and progress (Crust et al., 2014; St Clair-Thompson et al., 2017). Nevertheless, further research is required to strengthen these conclusions, especially in relation to university dropout criteria. Furthermore, most of the MT research in this achievement context has been predominantly guided by Clough et al.'s (2002) trait-based model of MT (Crust et al., 2014; St Clair-Thompson & Devine, 2023). Thus, there is a need to explore the potential of MT to explain student

withdrawal intentions and behaviors when an alternative state-like (psychological resource-based) operationalization is adopted (Gucciardi, 2020; Gucciardi et al., 2015).

Second, it advances current dropout research by emphasizing the central role of students' attitudes, particularly their academic satisfaction, in forming withdrawal intentions during the first year of university. This perspective converges with the theory of planned behavior (TPB, Ajzen, 1991) by ascribing relevance to the impact of students' attitudes on their decision to quit before graduation (see Dewberry & Jackson, 2018). Consistently, it follows its implicit premise that students actively choose whether to continue or leave their university studies, depending on their subjective utility assessment of the pros and cons of this course of action compared to feasible alternatives, as similarly construed by Bäumle et al.'s (2022) process model of student dropout intentions. Students' attitudes toward the course and the institution constitute important building blocks of this individual's subjective evaluation process (Aina et al., 2018; Eagly and Chaiken, 2007; Schmitt et al., 2008).

Despite the preliminary evidence reported by Dewberry and Jackson (2018) signaling a sizeable negative effect of students' attitudes toward the course on dropout intention, which is non-redundant with the other modeled predictors, i.e., self-efficacy and encouragement from family and friends to complete the course, research is scant in examining the impact of other relevant attitudinal objects. To fill this literature void, the current study adopts the construct of academic satisfaction, with a focus on students' attitudes toward their university. As construed by these authors, this attitudinal object may represent a stronger predictor of the intention to dropout of higher education for young students in the process of university adjustment, such as those included in our sample. In this early phase of the academic trajectory, their assessment of the resources made available by the university to promote their adjustment, success and the perceived utility of the education provided for their career prospects may exert a stronger influence on their deliberation of whether to continue in higher education or to pursue other training and professional pathways. Conversely, satisfaction with the course may take precedence over this referent when they intend to continue in college but are unsure whether to quit the present course and enroll in another more aligned with their vocational interests (Bäumle et al., 2022; Dewberry & Jackson, 2018; Galve-González et al., 2024).

Moreover, in line with previous research highlighting the relevance of such attitudinal influence on dropout intentions (Bean, 1983; Dewberry & Jackson, 2018; Duque, 2014), this study aims to further contribute to the literature by construing that academic satisfaction interacts with MT in determining dropout intentions. Therefore, following the logic of the conceptual models of university withdrawal, according to which dropout intentions result from the interplay between distinct individual factors (Aina et al., 2018; Bardach et al., 2020; Bäumle et al., 2022), we propose that when this attitude is unfavorable, it will cancel out the impact of MT on suppressing the intention to dropout.

Finally, to strengthen both contributions, we relied on a specific sample of first-year students. Previous research indicates that more than half of students who eventually leave university have already considered dropping out during their first year, making the identification of dropout determinants at this initial stage crucial for effective interventions (Bargmann et al., 2022; Westrick et al., 2021). Indeed, the first academic year constitutes a particularly vulnerable stage for university students, as it concentrates the highest levels of uncertainty, academic transition challenges, and fluctuations in commitment (Bernardo et al., 2025; Galve-González et al., 2024). Consequently, during this period, students face a demanding process of adaptation to new learning environments, pacing, and assessment structures, while simultaneously redefining their academic identity and expectations (De Clercq et al., 2018, 2022). These transitional tensions make first-year students more

susceptible to developing early doubts about program fit and respective prospects (Bargmann et al., 2022; Galve-González et al., 2024). In addition to the challenge of successfully adapting to a new social and organizational system at university, many students are unaware of the complex and potentially stressful academic demands (e.g., multiple assignments and assessments with strict deadlines), tending to misjudge the level of task effort required for performance achievement (Bakker & Mostert, 2024; Bargmann et al., 2022).

Nevertheless, as prior meta-analytic research has shown, meeting these performance demands, especially during the first academic year, is essential to preventing student dropout (see Westrick et al., 2021). These aspects reinforce the importance of focusing on first-year undergraduates and assign an inherent relevance to MT. Under such challenging and stressful circumstances, this construct can play a pivotal role in maintaining optimal levels of individual performance and progress (Clough et al., 2002; Gucciardi, 2020). Therefore, it is plausible to assume a significant effect of MT in counteracting dropout intentions during these early semesters, when students face new, challenging and sometimes overwhelming academic demands (Bakker & Mostert, 2024; De Clercq et al., 2022; Ibsen & Rosholm, 2024).

MT and student dropout intentions

As emphasized, the purpose of this paper is to contribute to the empirical validation of the hypothesized impact of university students' personal resources and academic attitudes in precluding university dropout intentions. Building upon the SD-R theory's premises, it develops under the assumption that to be successful in higher education, students need to fulfill multiple academic demands (exams, projects, group assignments) that cost considerable cognitive, emotional, and physical effort (Bakker & Mostert, 2024; Bakker et al., 2023). These demands may correspond to challenging activities that facilitate significant learning and skill acquisition (i.e., meaningful course lectures and stimulating activities), as well as hindrances that frustrate and thwart academic progress (i.e., ambiguous tasks and academic overload).

To effectively cope with these demands, students need both study and personal resources, which correspond, respectively, to aspects of studying that hold motivational potential and to students' beliefs in their ability to control the academic environment and its challenges (Bakker et al., 2023). Both types of resources are critical for buffering the inherently stressful impact of academic demands, facilitating performance and, ultimately, mitigating dropout intentions (Bakker & Mostert, 2024). Conversely, when students lack the required resources to dedicate effort to their studies, they tend to suffer health-impairment effects triggered by overwhelming study demands, becoming stressed and depleted of energy. These negative processes tend to result in disengagement, underperformance, and potential intention to quit (Bakker et al., 2023; Lesener et al., 2020). As asserted by the SD-R theory, students with more personal resources are better equipped to influence their environment by relying on their improved sense of self-efficacy and proactivity to sustain their engagement and increase study resources, like seeking lecturers' feedback and social support (Junça-Silva et al., 2022; Robayo-Tamayo et al., 2020).

Drawing upon the critical role of students' personal resources, the current study tests the promising impact of MT on reducing the intention to dropout. Arguably, MT's theoretical relevance to dropout is implicit in its own definition, since "dropout represents the failure of individuals, with given ability and goal commitment, to achieve desired educational goals" (Tinto, 1975, p. 78). Consistently, as defined by Gucciardi et al. (2015, p.28), MT refers to

“a personal capacity to produce consistently high levels of subjective (e.g., personal goals or strivings) or objective performance (e.g., GPA) despite everyday challenges and stressors as well as significant adversities.” Specifically, it represents a caravan of psychological resources that coalesce and become instrumental in achieving consistent performance, optimization and goal accomplishment, even in demanding circumstances (Gucciardi, 2020; Gucciardi et al., 2015).

These resources include a sense of *generalized self-efficacy*, i.e., the belief in one’s own ability to succeed in one’s performance context; *buoyancy* as the ability to develop the skills required to cope effectively with everyday pressures; *success mindset*, which includes the willingness and readiness to act towards the desired level of success; *contextual knowledge*, as situational awareness of the requirements and processes involved in effective performance; *emotion regulation*, as the ability to manage emotions to facilitate goal attainment; and *attention regulation* as the ability to maintain focus on intended goal pursuits despite potential distractors or irrelevant information (Gucciardi et al., 2015).

Previous research has shown that students’ focus on challenging and self-improving goal pursuits (i.e., personal best goals) promotes academic progress and counteracts their dropout intentions (see Bardach et al., 2020). Hence, it adds plausibility that MT, by capturing key psychological resources involved in achieving these individual goals, will emerge as an important factor in inhibiting such intentions. Meta-analytic evidence supports the instrumentality of psychological resources, especially academic self-efficacy, in attaining stronger levels of academic performance and improving student retention (Richardson et al., 2012; Robbins et al., 2004). Still, as a resource caravan, MT is posited to preserve and potentially outperform the isolated effects of its encompassed psychological resources by enacting a combined and synergistic effect on the attainment of goal strivings. Albeit untested on the empirical level, this effect is theorized to emerge from its resources’ communalities in terms of being *purposeful* in conferring direction and energy towards self-set goals; *efficient* in building congruency between exhibited behaviors and pursued goals; and *flexible* in improving self-regulation processes to cope with involved stressors or demands (Gucciardi, 2020; Gucciardi et al., 2015). Accordingly, MT may hold stronger power for predicting dropout intentions due to its broader construct bandwidth and close conceptual alignment with the criterion of dropout intentions, when conceived as a withdrawal process instigated by a lack of students’ resources to accomplish core academic demands. Despite remaining totally unexplored in MT-related literature, extant research within other individual differences in the occupational domain, like cognitive ability and personality, shows that broad constructs outperform their more specific features or facets in predicting performance behaviors and overall success (Rodrigues & Rebelo, 2022; Salgado, 2017).

Although limited, the empirical evidence shows that students who are more mentally tough have better academic and social adjustment upon entering university (St Clair-Thompson et al., 2017), higher academic achievement (Lin et al., 2017; St Clair-Thompson & Devine, 2023), and are more likely to thrive and progress at university (Crust et al., 2014; Gucciardi et al., 2015). Based on the presented theoretical and empirical aspects, we hypothesize that:

Hypothesis 1 Mental toughness exerts a negative impact on students’ dropout intention.

Academic satisfaction and student dropout intentions

As noted above, the intention and final act of leaving college constitute a complex and dynamic process in which individual factors interplay with attitudinal processes (Ibsen

& Rosholm, 2024; Schnettler et al., 2020). Existing dropout frameworks acknowledge this logic and, despite varying their emphasis on pre- and post-entry antecedents, they tend to converge in attributing an important role to student attitudes as a more proximal vehicle that links these factors to withdrawal intentions and subsequent dropout behaviors. To illustrate, foundational sociological approaches such as the student integration model (Tinto, 1975, 2006) emphasize the impact of students' social integration (i.e., patterns of interaction with faculty members and other students) and academic integration (i.e., grade performance and intellectual development) on their subsequent dropout decisions. However, these effects are modeled to occur through attitudinal mechanisms captured by students' level of commitment to academic goals and to the institution. A similar proposition is present in subsequent psychological perspectives, such as the student attrition model (Bean, 1983), which draws on the organizational psychology literature about employee turnover. According to this model, focal academic attitudes (individual subjective assessments of the practical value of their university education and its implications for personal development) are considered immediate precursors of this outcome and are "expected to be the best predictor of intention to leave" (Bean, 1983, p. 29). Likewise, Bäumke et al.'s (2022) process model of student dropout intentions integrates such attitudinal influence, captured by the perceived lack of fit between the student and the university learning content, as one of the early stages of the formation of the intention to dropout.

The application of Ajzen's (1991) theory of planned behavior (TPB) in predicting dropout also acknowledges and empirically supports the role of student attitudes as accurate predictors of this outcome (Dewberry & Jackson, 2018). Further research has supported the relevance of students' academic attitudes after entering the university in influencing the formation of dropout intentions (Álvarez-Pérez et al., 2021; Duque, 2014; Schmitt et al., 2008).

Taken together, these aspects are consonant with the growing recognition of dropout as a forward-looking, ongoing decision-making process in which students continuously revise the implied costs and expected returns of remaining enrolled and investing effort in the course (Aina et al., 2018; Bäumke et al., 2022; Dewberry & Jackson, 2018). Academic attitudes arguably play a primary role in this subjective evaluation, as they reflect the degree of favorability that the students ascribe to continuing their enrollment based on their academic experience, compared with other prospective and viable options (Ajzen & Fishbein, 2005; Dewberry & Jackson, 2018; Eagly & Chaiken, 2007).

Despite testing the attitudinal effect regarding the degree to which students are satisfied with their course and considering it the right choice, as underlined by Dewberry and Jackson (2018), other attitude objects, such as attitude toward the university, should be considered when predicting dropout criteria. The latter was adopted in the current study under the proposition that it may accurately predict first-year students' intention to dropout, while satisfaction with the course will arguably be a better predictor of changing majors (Aina et al., 2018; Dewberry & Jackson, 2018). These aspects lead to the hypothesis that:

Hypothesis 2 Academic satisfaction exerts a negative impact on dropout intention.

The moderating effect of academic satisfaction in the link between MT and dropout intentions

In addition to recognizing the influence of academic satisfaction in counteracting dropout intentions, this study further proposes that this attitudinal construct will interact

with MT to enable its contribution to mitigating such withdrawal intentions. According to Gucciardi, (2020) state-like conceptualization, MT constitutes a caravan of psychological resources that “represents a human capacity or potential for action toward some personally valued objective” (p. 113). Therefore, the enactment of these resources, their refinement and conservation, primarily towards goal attainment (Gucciardi, 2020; Hobfoll et al., 2018), depends on the subjective (i.e., attitudinal) value that the individual assigns to this prospective attainment compared to perceived alternatives. When students are satisfied with their academic experience, they tend to ascribe a positive subjective value or degree of favorability to pursuing a university degree, compared to alternative training and occupational paths. This positive attitude comes from several sources, such as the amount of learning they receive at university, the quality of the teaching staff and the extent to which they develop knowledge and skills relevant to their employability (Duque et al., 2014; Schmitt et al., 2008).

Following the logic of the conceptual models of university withdrawal and subsequent research, according to which dropout intentions result from the interplay between distinct individual factors (Aina et al., 2018; Bardach et al., 2020; Bäumle et al., 2022), we propose that an unfavorable attitude toward the university will neutralize the impact of MT on reducing the intention to dropout.

Hence, academic satisfaction is expected to moderate the extent to which individuals will deploy their MT resources to persist in completing their studies despite challenging academic demands. Consistently, we hypothesize that:

Hypothesis 3 Academic satisfaction moderates the negative effect of MT on dropout intention, strengthening this effect when students are satisfied with their university.

Figure 1 depicts the model under study.

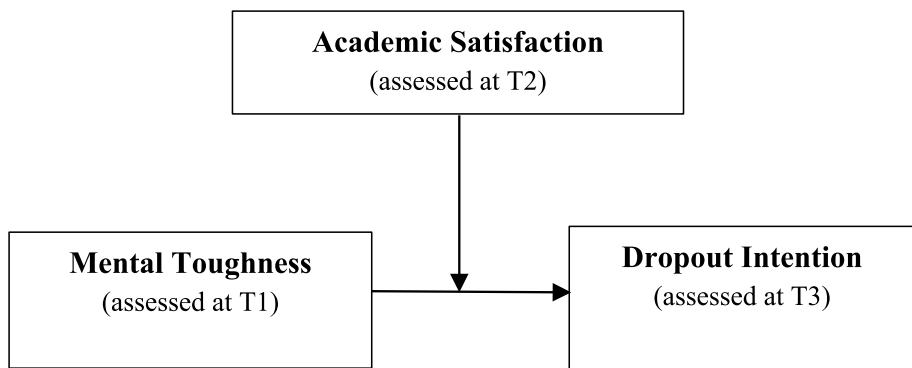


Fig. 1 Hypothesized model

Method

Procedure and participants

The current study was conducted with a convenience sample of $N=187$ first-year students associated with a commuter (non-residential) public university, using three distinct waves of data collection conducted throughout the academic year. Data was collected in each wave using an online survey. In a preliminary stage, this research project was approved by the university's ethics committee and data protection office (reference P49). At the beginning of the academic year (i.e., in September), first-year students from several courses were approached directly during their classes by a member of the research team, who briefly explained the research goals and study's main stages. The anonymity, confidentiality and the exclusive use of the collected data for research purposes were emphasized. Those who agreed to participate were asked to sign the informed consent form and to provide their email address to receive the online survey links for each phase.

During the first phase, which took place during the months of October and November, an email with a link to complete the respective online questionnaire was sent to all participants. This questionnaire included the assessment of socio-demographic data, MT and other academically relevant information. To link each student's data across the three waves of the study, while maintaining the anonymity of the survey, students were instructed to create a personal code and were required to enter it in the first section of the questionnaire. An initial sample of 274 valid questionnaires was obtained.

The second phase took place after 7 months, at the end of the second semester (June). In it, all participants from the previous phase received another link by email to complete a second questionnaire, which included measures of academic performance and satisfaction with the university. A total of $N=210$ valid questionnaires were correctly matched with data from the first wave, representing a response rate of 77%.

In the third and final phase, which was launched approximately 1 month after the second phase (in late July, coinciding with the end of the academic year), students received an email with a link to the final online survey to report their intention to leave the university. As a result, a final sample of $N=187$ first-year students was collected (a response rate of 89% relative to the second-phase sample). The sample comprised 72.2% females and 27.8% males, with a mean age of 19.03 ($SD=2.34$), ranging from 17 to 35 years. The participants were enrolled in different courses, including psychology (36.4%), physical education and sport (17.1%), communication sciences (16.0%), nursing (14.4%), management (10.2%), and biochemistry (5.9%).

Potential non-response bias was examined by comparing the students who completed all data collection waves ($N=187$) and those who had dropped out of the study in the second and third waves ($N=87$). The results indicated there was no association between participants' gender and withdrawal from the study [$\chi^2(1, N=274)=0.13$, $p=.77$, $\phi=-0.02$, $p=.723$]. Similarly, participants who ceased participation early did not differ significantly from those who completed the study, in terms of age [$M=19.34$, $SD=2.75$, $M=19.03$, $SD=2.34$, respectively, $t(272)=-0.98$, $p=.32$, $d=-0.13$];

socioeconomic status [$M = 3.02$, $SD = 1.24$, $M = 3.28$, $SD = 1.29$, $t(272) = 1.52$, $p = .13$, $d = .20$]; as well as in their averaged MT scores [$M = 5.22$, $SD = .71$, $M = 5.19$, $SD = .76$]. These results suggest that potential attrition bias is minimal and unlikely to have meaningfully influenced the effects under study.

Measures

Mental toughness

This variable was assessed using Gucciardi et al.'s (2015) 8-item Mental Toughness Index (MTI). Participants were instructed to report the extent to which each item describes how they think, feel, and behave when performing their role and the encompassing tasks of a higher education student, using a 7-point Likert scale ranging from 1 = *strongly disagree* to 7 = *strongly agree*. A sample item is "I am able to regulate my focus when performing tasks."

Academic satisfaction

Satisfaction with the university was measured using Schmitt et al.'s (2008) 5-item scale, which covers the extent to which students are satisfied with the overall education they are receiving, its usefulness and positive impact on future employment and careers, as well as the amount of learning in the classes and the academic level of their teachers. An example item is "I am satisfied with the extent to which my education will be useful for getting future employment." Answers were provided using a five-point Likert-type scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*.

Higher education dropout intentions

Following the procedure adopted by Baalman et al. (2024), this variable was measured using a 3-item subscale, which assesses the intention to dropout completely, i.e., to leave university before graduation. An example item is "I am seriously thinking of giving up studying." Students responded on a 5-point Likert-type scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*.

Control variables

Given previous meta-analytic evidence that first-year academic performance is an important antecedent of second-year retention (Westrick et al., 2021), students' GPA at the end of the second semester was measured (in the second wave) to control its effects. Students were instructed to report this data after consulting their official university records, available online. According to previous research, self-reported GPA is highly correlated with official GPA (see Kuncel et al., 2005), making it a reliable surrogate and a suitable alternative to accessing their formal transcripts, which would compromise the anonymity of the survey. To account for potential effects of students' sociodemographic background, we measured the variables of gender, age, and socioeconomic status, given their associations with dropout criteria (Aina et al., 2018; Baalman et al., 2024; Larsen et al., 2013). Students' economic status was proxied by their respective parents' level of education (Dickinson et al., 2014; Islam et al., 2018).

Results

Confirmatory factor analyses

Before testing the research hypotheses, the measurement model was evaluated through confirmatory factor analysis (CFA) with the maximum likelihood estimation method, using IBM SPSS AMOS (Version 27).

The three-factor measurement model (composed of the respective items of MT, academic satisfaction and dropout intentions) did not yield an acceptable fit to the data ($\chi^2(101) = 219.02$, $p < .001$, CFI = .896, RMSEA = .079, SRMR = .078). The modification indices led to the addition of the errors' covariation of items 5 and 7 from the MTI, which is justified by the relatedness of their content ("I effectively execute my knowledge of what is required to achieve my goals" and "I am able to execute appropriate skills or knowledge when challenged"), as well as by the expected theoretical communalities between MT's resource indicators, as argued by Gucciardi et al. (2015). The analysis of the items' loadings signaled the need to drop item 6 ("I consistently overcome adversity" for *buoyancy*) because it was the only item in the model with a loading in the respective factor (.387) below .50 (Kline, 2016). Moreover, its exclusion slightly improves the internal consistency of the scale, from .83 to .87. Given that it corresponds to *buoyancy*, the single psychological resource assessed with two indicators, the final scale keeps an indicator/item per resource, which eases the concerns that dropping this item may result in potential scale theoretical content deficiency.

The three-factor model incorporating the errors' covariate and the withdrawal of the item mentioned above yielded an acceptable fit to the data ($\chi^2(86) = 142.18$, $p < .001$, CFI = .948, RMSEA = .059, SRMR = .071). All standardized factorial loadings of the items on the respective latent variables were significant ($p < .001$) and ranged between .52 and .92, indicating convergent validity. The correlations between the three latent variables were $-.23$, $-.24$, and $.26$, indicating discriminant validity due to their small magnitude (Kline, 2016). Additionally, a one-factor model was tested, and the results indicated an unacceptable fit to the data ($\chi^2(89) = 615.58$, $p < .001$, CFI = .513, RMSEA = .178, SRMR = .155). Thus, the three-factor model, without item 8 of the MTI, was retained in testing our hypotheses.

Hypotheses testing

Descriptive statistics, intercorrelations and reliability coefficients are presented in Table 1. As expected, MT and academic satisfaction emerged as significant antecedents of dropout intentions, giving support for H₁ (MT negatively predicts dropout intentions) and H₂ (academic satisfaction negatively predicts dropout intentions). Student GPA was also significantly related to this criterion, supporting previous studies' recommendations to control its effects when mapping other predictors of dropout (Schnettler et al., 2020; Westrick et al., 2020). Nonsignificant bivariate effects were detected for the other intended controls of gender, age, and socioeconomic status, showing the inconsistency of these effects throughout primary dropout research, as reported in previous research and reviews of related literature (Aina et al., 2018; Larsen et al., 2013). Thus, only GPA enters the further analysis as a covariate.

Table 1 Means, standard deviations, and intercorrelations

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Gender ^a (T1)	0.71	0.45	–						
2. Age (T1)	19.03	2.34	–.01	–					
3. Socioeconomic status (T1)	3.28	1.29	–.13	–.06	–				
4. GPA (T2)	14.6	1.48	.21**	.14*	.06	–			
5. Mental toughness (T1)	5.20	0.76	–.02	.03	.15*	.23**	(.85)		
6. Academic satisfaction (T2)	3.47	0.68	.05	.01	–.10	.29***	.23**	(.81)	
7. Dropout Intentions (T3)	1.80	0.91	–.03	–.04	.03	–.24**	–.23**	–.24**	(.81)

Notes. *N* = 187. T = Data collection time point, ^aMale = 0, Female = 1, GPA = Grade point average. **p* < .05. ***p* < .01. ****p* < .001. Cronbach's alphas are in brackets

Regarding H_3 , which posits academic satisfaction as a moderator of the negative effect of MT on dropout intention, it is tested through bootstrapping, with model 1 of the PROCESS macro for SPSS, following Hayes' guidelines (2018). Table 2 shows the results of this analysis. The moderator and the predictor, which are included in the interaction terms, were mean-centered before analysis. The results support the negative impact of MT and academic satisfaction on dropout intention ($p < .05$). The interaction effect and the amount of additional explained variance of the product term were significant, $\Delta R^2 = .03$, $\Delta F(1182) = 5.73$, $p = .018$.

Conditional effects of the predictor (mental toughness) on the criterion (dropout intention) at different values of the moderator (academic satisfaction) were calculated (Table 3). The values of the moderator correspond to one standard deviation below the mean (low satisfaction), at the mean (moderate satisfaction), and one standard deviation above the mean (high satisfaction). The results show that the effects of MT on students' dropout intention are negative and statistically significant when the level of academic satisfaction is moderate and high (95% CI = -0.41 to -0.05 , and -0.69 to -0.15 , respectively). This effect is strengthened when students are highly satisfied with their university. However, this effect is weaker and nonsignificant at low levels of academic satisfaction (CI = -0.24 to 0.16). These results are displayed in Fig. 2. Altogether, the findings support H_3 .

Discussion

The urge to reduce the persistent high dropout rates, especially during the first academic year, and mitigate their negative consequences for students, institutions, and society remains a critical and unresolved challenge (Ibsen & Rosholm, 2024; Schnettler et al., 2020). Building on the

Table 2 A multiple regression predicting dropout intention. Academic satisfaction served as a moderator variable.

	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>R</i> ²	<i>F</i> (4182)
Dropout intention					.14	7.18***
GPA	–0.10	0.05	–2.13	.035		
MT	–0.23	0.09	–2.54	.012		
AS	–0.20	0.10	–2.02	.045		
MT × AS	–0.28	0.12	–2.39	.018		

Notes. *N* = 187. MT = Mental toughness, AS = Academic satisfaction. ****p* < .001

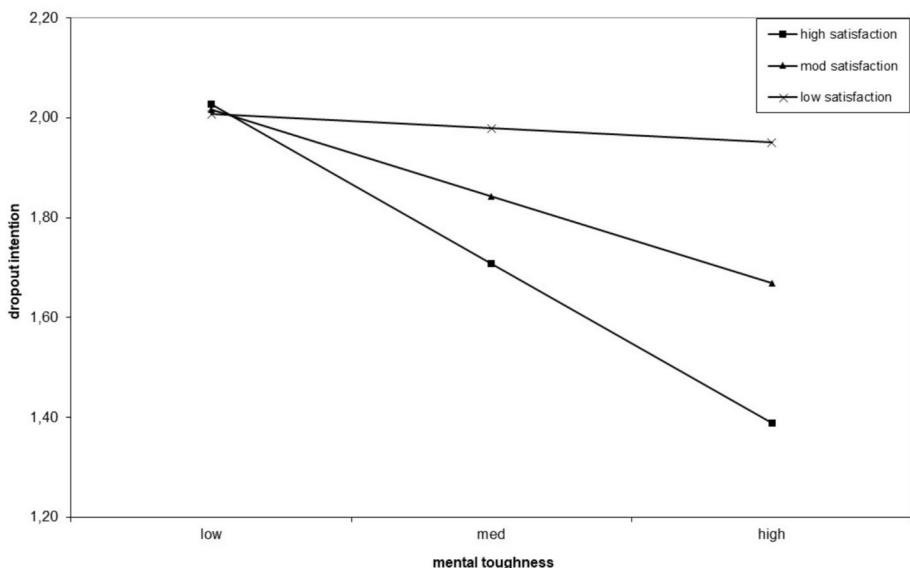
Table 3 Conditional effects of MT on dropout intentions at different academic satisfaction levels

	Dropout intention			
	<i>B</i>	<i>SE</i>	<i>t</i>	95% CI
LL UL				
Low satisfaction	−0.04	0.10	−0.36	−0.24 0.16
Moderate satisfaction	−0.23	0.09	−2.54*	−0.41–0.05
High satisfaction	−0.42	0.14	−3.09**	−0.69–0.15

Notes. $N = 187$. * $p < .05$; ** $p < .01$. 5000 bootstrap resamples were used for confidence intervals

growing emphasis on a psychological framework for mapping the core antecedents of higher education dropout (Bäulke et al., 2022; Dewberry & Jackson, 2018), the current paper investigated the impact of the interplay between MT and academic satisfaction on dropout intentions. The obtained findings provide several theoretical and applied contributions to the literature.

Consistent with the first hypothesis, MT exerts a negative influence on the intention to dropout at the end of the academic year, even when academic performance effects are accounted for. These results suggest that this construct should be considered within the scope of the individual variables that may counteract this negative outcome (see Aina et al., 2018; Larsen et al., 2013 for reviews). From a conceptual viewpoint, these findings converge with the premises of the SD–R model (Bakker & Mostert, 2024), according to which students' personal resources play a role in facilitating the accomplishment of academic demands, preventing the formation of the intention to dropout. Specifically, they indicate that MT could represent a valid construct to capture the extent to which students acquire, maintain, and develop personal psychological resources, critical to their academic achievement, progress, and personal growth (Gucciardi, 2020; Hobfoll et al., 2018). At this level, our results are aligned with the theoretical value of

**Fig. 2** Interaction effects of academic satisfaction and MT on dropout intention

MT as a useful framework for examining the impact of non-cognitive attributes in promoting individual success and retention in higher education (Hsieh et al., 2023; Lin et al., 2017; McGeown et al., 2016). Still, further research is crucial to evaluate whether MT's broader bandwidth and its closer conceptual alignment with dropout, as a process driven by insufficient resources to meet academic demands, provide predictive advantages over narrower constructs, like self-efficacy (Richardson et al., 2012; Robbins et al., 2004). In addition, demonstrating such incremental value would be especially relevant for designing psychoeducational interventions, given that MT has been conceptualized as a state-like resource that can be enhanced through structured training programs in educational settings.

Moreover, the findings provided support for the second hypothesis, stating the negative effect of students' academic satisfaction on developing dropout intentions. At a conceptual level, they align with the application of the TPB to the prediction of dropout intentions, particularly concerning the assumption that attitudes play a meaningful role in determining that criterion.

The results also support the third hypothesis, according to which this attitudinal response interacts with MT in determining students' intention to dropout at the end of their first year of study. Specifically, they suggest that the effect of MT in dropout intentions is enhanced when students are satisfied with their academic experience. Thus, although students would develop psychological resources encompassed by MT (i.e., self-efficacy, emotional and attentional regulation) throughout their early college experience, they will only mobilize these resources to persevere with their course completion, when experiencing moderate and high levels of academic satisfaction. At a higher theoretical level, these findings are consistent with an interactionist theoretical corollary, asserting that the ongoing process of developing the intention and closely related behavior of dropping out depends on the joint influence of individual attributes (i.e., MT resources), and attitudinal factors focusing on the specific university's context (Bäulke et al., 2022; Dewberry & Jackson, 2018; Ibsen & Rosholm, 2024). Thus, they support recent calls for more research on the combined effects of distinct types of dropout predictors (Bardach et al., 2020). At a more fine-grained conceptual level, they align with the application of the TPB to the prediction of dropout intentions, particularly concerning the assumption that academic attitudes towards the course and other relevant objects, particularly the satisfaction with the university, play a meaningful role in determining this criterion. Nevertheless, our findings further suggest that this attitudinal construct may have an additional boundary effect on other key dropout antecedents proposed by this model, such as students perceived self-control, which may be arguably proxied by MT due to its self-efficacy and emotional regulation components. Thus, academic attitudes, like other attitudinal constructs (Ajzen & Fishbein, 2005; Eagly & Chaiken, 2007), appear to function as a psychological vehicle through which students ascribe subjective value to their university experience, and further function as a respective facilitator or barrier to the mobilization of individual psychological resources, particularly those captured by MT, towards course persistence until graduation.

From an applied perspective, the study also underscores the usefulness of focusing on MT and academic satisfaction as early indicators for intervention. As underlined, MT, as a state-like resource caravan, presents opportunities for structured development programs, focusing on psychological skills development using feedback and support dynamics within peer group approaches (Ibsen & Rosholm, 2024; Meggs & Sewell, 2022). Nevertheless, as emphasized above, there is an urge to empirically establish the incremental validity of MT over other well-established antecedents of higher education transition, adjustment and retention, to reach more solid conclusions regarding the purported conceptual and applied value of the MT construct and its implied framework. Specifically in relation to meaningful motivational and social factors, like goal

setting, self-efficacy and encouragement from family and fellow students (Baalman et al., 2024; Bardach et al., 2020; Morelli et al., 2022; Robbins et al., 2004).

Our findings also indicate that academic satisfaction, as a key attitudinal construct reflecting students' evaluations of their university, constitutes a particularly relevant factor for first-year undergraduates when deciding whether to remain enrolled or to pursue alternative career trajectories. Still, they suggest that working on students' MT development in isolation, i.e., without optimizing the academic context in a way that is valued by students to promote positive academic attitudes, may prove to be an unfruitful approach. A more effective strategy for mitigating dropout, particularly among first-year students, involves regularly assessing academic attitudes and using these data to strengthen students' positive perceptions of learning as meaningful for their academic growth, personal development, and future career (Duque et al., 2014; Schmitt et al., 2008).

Despite these contributions, the current study has some shortcomings. First, independently of addressing the calls of Bakker and Mostert (2024) to empirically validate the SD-R core predictions, particularly that student's resources are particularly predictive of performance and university dropout, this study does not fully test their implied mechanisms. Specifically, the beneficial effects of individual resources are posited to occur through stress reduction and promotion of engagement and study crafting. This pathway is particularly relevant for future MT research guided by the SD-R framework, because MT is defined as a state-like capacity that helps individuals build and sustain engagement in goal-directed pursuits, even under stressful circumstances (Gucciardi et al., 2017; Gucciardi, 2020). Second, our findings support the application of TPB in predicting the intention to dropout, under the assertion that students' attitudes, specifically their satisfaction with the university, represent a significant predictor of this criterion. However, they are uninformative of the level of non-redundancy of this variable with other attitudinal referents and additional TPB predictors, like student perceived self-control and social norms. Future research is required to conclude whether specific attitudinal objects may vary in relevance, depending on the characteristics of the students and on the specific type of dropout under study (Ajzen & Fishbein, 2005; Bäumle et al., 2022; Dewberry & Jackson, 2018). While high levels of dissatisfaction towards the course, in the sense of lack of vocational alignment, may become more predictive of dropout in the form of changing between college degrees, strong dissatisfaction with the institution and its educational resources may represent a stronger predictor of dropout in terms of abandoning the university.

Third, the sample size obtained, after collecting data on three time points during the academic year, was relatively small. While this design allows greater methodological robustness in terms of respecting the implied directionality of the effects, the replication of these findings with larger samples is a necessary condition before more definitive conclusions can be drawn. Furthermore, despite our caution to control other predictors with the potential to confound the tested effects, such as student demographics and academic performance, the brevity of the survey intended to maximize the sample size prevented the inclusion of other relevant antecedents. This shortcoming calls for future research to examine whether the effects of MT and academic satisfaction are independent, redundant, or may interact with other attitudinal, motivational and social mechanisms, like students' best personal goals, engagement and a sense of belonging (Álvarez-Pérez et al., 2021; Bardach et al., 2020; Pedler et al., 2021).

Conclusion

The present study contributes to the growing body of literature on first-year university dropout by jointly examining the role of a personal psychological resource, MT, and an attitudinal evaluation, academic satisfaction. Consistent with our hypotheses, the findings allow us to conclude that MT plays a significant role in mitigating students' intentions to dropout, yet contingent positive academic attitudes are needed to unlock MT's beneficial effect on dropout intention. Thus, our findings highlight the importance of considering them in combination, offering a more comprehensive understanding of the psychological processes shaping early dropout intentions.

Author contribution All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Nuno Rodrigues, Teresa Rebelo, and Naira Rodríguez. The first draft of the theoretical part of the manuscript was written by Nuno Rodrigues and all authors commented on previous versions of the manuscript and wrote the methodological, results, and discussion sections. All authors read and approved the final manuscript.

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Data availability All data and materials supporting the findings are available from the first author upon reasonable request.

Declarations

Ethics approval and consent to participate The project, including this study and all its involved procedures, has previously been approved by the University of Madeira Ethics Committee (code N° P48). All participants provided their informed consent.

Competing interests The authors declare no competing interests.

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Current themes of research and most relevant publications

Learning culture and team learning processes.

- Kucharska, W., & Rebelo, T. (2022). Knowledge sharing and knowledge hiding in light of the mistakes acceptance component of learning culture- knowledge culture and human capital implications. *The Learning Organization* 29(6), 635–655. <http://dx.doi.org/10.1108/tlo-03-2022-0032>.
- Kucharska W., & Rebelo T. (2022). Transformational leadership for researcher's innovativeness in the context of tacit knowledge and change adaptability. *International Journal of Leadership in Education*. <https://doi.org/10.1080/13603124.2022.2068189>.

Current themes of research and most relevant publications

Dehumanization and turnover intentions in work and academic contexts

- Harris, L.T., Delgado, N. (2025). The functional role of interpersonal dehumanization and associated brain networks. *Nature Reviews Psychology*, 4, 336–346. <https://doi.org/10.1038/s44159-025-00439-9>
- Delgado, N., Mattavelli, S., Brambilla, M., Rodríguez-Gómez, L., Harris, L.T. (2023). Humanity at first sight: Exploring the relationship between others' pupil size and ascriptions of humanity. *Journal of Experimental Social Psychology*, 106, 1–6. <https://doi.org/10.1016/j.jesp.2023.104455>