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Impact of Need for Cognitive Closure on Achievement Goals and Academic Performance: A Study in Upper Secondary Schools

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Abstract

The present research investigated the relationships between Need for Cognitive Closure (NfCC), achievement goals and academic performance in a sample of secondary school students. The main aim of this study was to provide a scientific contribution to an area of research that is still largely unexplored, namely the role of NfCC in students' school experiences. The results of this study showed that NfCC has a positive relationship with both performance-approach and performance-avoidance goals, although the relationship is stronger for the latter. Furthermore, a positive relationship emerged between NfCC and mastery-avoidance goals, whereas no significant relationship was found between NfCC and mastery-approach goals. These findings suggest that students driven by NfCC are more motivated to avoid academic failure than to pursue their educational goals actively. Interestingly, NfCC had a direct and indirect negative relationship with students' academic performance through achievement goals in their avoidance dimensions. Similarly, NfCC was positively related to students' academic performance through performance-approach goals. The results of this study require further investigation. However, this research provides important insights into the individual mechanisms underlying why students engage in school and defines NfCC as a potential factor in explaining students' motivation and academic adjustment.

Keywords: need for cognitive closure; achievement goals; academic performance; high school students

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Introduction

The present research investigated the role of the Need for Cognitive Closure (NfCC; Kruglanski & Webster, 1996) in educational settings. Specifically, the main aim of this study was to examine the relationship between NfCC and students' achievement goals and academic performance. To date, most psychological research on student motivation and performance has been based on the Achievement Goal Theory (AGT; Ames, 1992; Ames & Archer, 1988), one of the most popular and applied theories in the field of education (Urdan & Kaplan, 2020). Notably, studies drawing on AGT have shown that school climate – i.e. teachers' practices and classroom learning goals (e.g., Midgley et al., 2001; Ryan & Patrick, 2001) – affects students' achievement motivation. Consequently, little attention has been paid to individual factors – related to student characteristics – predicting achievement goals. Given these limitations, we suggest that NfCC may be an antecedent of achievement goals and, consequently, a predictor of academic performance. In line with DeBacker and Crowson's considerations (DeBacker & Crowson, 2006, 2008, 2009), we contend that examining the impact of epistemic motivations on teaching-learning processes may provide a more accurate understanding of the mechanisms that shape students' educational experiences.

Cognitive theories applied to the study of motivational processes at school: Achievement goals Theory

Motivation is a crucial construct in psychological studies applied to educational contexts (Elliot et al., 2017; Wentzel & Miele, 2016). Particularly, Achievement Goal Theory focuses on why students engage in school and the standards they use to evaluate their academic success (Ames, 1992; Kaplan et al., 2014; Urdan & Maehr, 1995). This famous theoretical model defined the presence of different achievement goals that can be traced back to different emotional, cognitive, and behavioural patterns (Butera et al., 2023; Dweck, 1986; Elliot, 2005; Hulleman et al., 2010; Nicholls, 1984; Pintrich, 2000a; Pintrich, 2000b; Van Yperen et al., 2015; Senko & Dawson, 2017). The first models developed within the AGT proposed two main types of motivational orientations: *mastery goals* and *performance goals* (Ames, 1992; Ames & Archer, 1988; Dweck, 1986; Nicholls, 1984). Mastery goals, which emphasise personal competence development (Senko, 2019), are associated with adaptive patterns of emotions, cognition, and behaviours, stimulating learning and ensuring positive outcomes (Ames, 1992; Cho & Kim, 2019; Elliot & Dweck, 1988). In turn, performance goals emphasise demonstrating competence relative to peers (Senko, 2019). Students pursuing these goals often have little confidence in their abilities and experience anxiety and negative affect in the school contexts (e.g., Senko & Dawson, 2017; Dweck, 1986; Nicholls, 1984). This dichotomous model, in which mastery and performance goals have been conceptualised in opposing ways, has shown some shortcomings over time. Although research has demonstrated the superiority of mastery goals regarding many desirable educational outcomes, studies on performance goals have produced mixed results (for an excursus on the AGT's theoretical models, see Elliot & Hulleman, 2017). Consequently, in the late 1990s, a trichotomy model of achievement goals was proposed, wherein the dimensions of *approach* – the effort to achieve success – and *avoidance* – the effort to avoid failure – have been introduced only for performance goals. Research on this new conceptualisation showed that mastery-approach and performance-approach goals facilitate self-regulation, favouring engagement in academic tasks and encouraging intrinsic motivation (Elliot & Harackiewicz, 1994, 1996; Pintrich, 2000a). In particular, performance-approach goals emerged as predictors of effective school performance (grades) (Harackiewicz et al., 2002). On the contrary, performance-avoidance goals appear as an obstacle to the development of intrinsic motivation and are associated with maladaptive outcomes (Elliot, 1999, 2005, 2006; Elliot & Church, 1997; Midgley et al., 2001; Mouratidis et al., 2018; Smith et al., 2002). In the early 2000s, the approach-avoidance distinction was also conceptualised for mastery goals (2x2 goal model; Elliot, 1999; Elliot & McGregor, 2001; Pintrich, 2000b). Specifically, mastery-avoidance goals refer to students' preoccupation with not achieving their desired goals and standards of proficiency. However, due to the hybrid nature of mastery-avoidance goals, predictors and outcomes of this form of motivation are still unclear.

Studies based on AGT in education continue to proliferate and have provided insights into how to intervene in learning environments to facilitate students' academic adaptation and success. However, we still know little about the individual factors that may influence achievement goals, which should be considered in studies on these topics. The present study was designed to fill this gap, investigating the relationship between NfCC and achievement goals.

The role of epistemic knowledge in developing knowledge and school motivation: the need for cognitive closure

The studies conducted so far on epistemic beliefs (Roets et al., 2015) have described the Need for Cognitive Closure (NfCC) as an epistemic motivation that influences the person's tendency to engage in various tasks by adopting a critical and reflective attitude and thinking (Kruglanski & Webster, 1996). NfCC refers to the longing for a definitive response to a query and avoiding uncertainty (Kruglanski, 1989, 1990). It thus represents a motivational tendency affected by the perceived cost of closure or avoiding closure (Kruglanski & Webster, 1996). Specifically, people with high levels of NfCC activate two sub-mechanisms (Kruglanski & Webster, 1996): *seizing* and *freezing*. *Seizing* refers to quickly "grabbing" information to achieve closure. *Freezing* refers to "crystallising" the knowledge formed. Researchers defined NfCC as a dispositional variable (Webster & Kruglanski, 1996), although a vast amount of studies demonstrated that environmental factors impact motivation to seek or avoid the closure (e.g., stressors experiences: Kruglanski et al., 1993; time pressure experiences: Bukowski et al., 2013; Capozzi et al., 2019; Theodorou et al., 2023; environmental noise: Livi et al., 2015a, 2015b, 2018).

The NfCC has been the subject of much academic interest and research, particularly in social and personality psychology. On the contrary, the construct has received little attention in

educational psychology. To overcome this limitation, DeBacker and Crowson (2009) highlighted the importance of applying the need for closure in educational contexts, as it helps to shed light on the complex mechanisms that regulate students' motivation to learn. The Authors stressed that the need for closure, like other epistemic beliefs and motivations, may impact learning by promoting critical and reflective thinking as well as cognitive processes associated with problem-solving strategies (DeBacker & Crowson, 2009; Kruglanski, 1989; Kruglanski & Webster, 1996).

In this regard, some studies have shown significant relationships between the NfCC and academic success variables. The first study on this topic investigated the relationships between epistemological beliefs, need for closure, achievement goals and cognitive engagement in a sample of university students (DeBacker & Crowson, 2006). Specifically, the Authors hypothesised that students with a high need for closure would not pursue mastery goals, which are associated with uncertainty and ambiguity, but prefer performance goals. In fact, according to the need for closure theory (Kruglanski, 1989; Kruglanski & Webster, 1996), students with a high need for cognitive closure would be motivated to avoid ambiguity in problem-solving by accepting the first available solutions and looking for external standards against which to compare their performance. DeBacker & Crowson's study (2006) demonstrated that the need for closure is a variable implicated in learning processes, as it was positively correlated with performance goals (approach and avoidance) and cognitive strategies (shallow cognitive engagement). However, the relationships between the need for closure and mastery goals were unclear, and an indirect effect of the need for closure on learning strategies through achievement goals did not emerge (DeBacker & Crowson, 2006).

In subsequent studies, DeBaker and Crowson (2008) developed a measure to capture the need for closure in the classroom. They identified two components of the need for closure: a) the need for structure (i.e. preference for structure), which relates to the organisational aspects of the classroom and, consequently, to the requirement for a predictable and orderly academic environment; and b) the need for certainty (i.e. preference for certainty), which involves the need for clear answers and the avoidance of ambiguity in the content of the subjects (DeBaker & Crowson, 2008). Regarding the relationships between the classroom need for closure and achievement goals, DeBaker and Crowson (2008) found that both the preference for structure and the preference for certainty were positively correlated with performance-avoidance goals (Studies 1 and 2 in DeBaker & Crowson, 2008). The associations between the classroom need for closure with the performance-approach and mastery goals were unclear. Performance-approach goals were positively correlated with both dimensions of the classroom need for closure in Study 1 (DeBaker & Crowson, 2008). However, in Study 2 (DeBaker & Crowson, 2008), the relationship between the preference for structure and performance-approach goals was not significant. Instead, mastery goals were negatively correlated with the preference for certainty (Study 1 and Study 2 in DeBaker & Crowson, 2008) and not correlated (Study 1 in DeBaker & Crowson, 2008) or positively correlated (Study 2 in DeBaker & Crowson, 2008) with the preference for structure.

Particularly relevant to the aims of our study, Harlow and colleagues (2011) investigated the relationship between the classroom need for closure and learning processes in a group of high school students, taking into account the mediating role of achievement goals. The findings of this study revealed that the need for closure was partially associated with learning processes through achievement goals. Specifically, mastery goals showed a negative correlation with the preference for certainty and a positive correlation with the preference for structure. Instead, performance-approach goals were positively correlated with the preference for structure but not with the preference for certainty. According to previous findings (DeBaker & Crowson, 2006, 2008), performance-avoidance goals showed positive correlations with all classroom need for closure's dimensions (Harlow et al., 2011). In addition, only mastery goals mediated the relationship between the need for closure and learning processes (deep or surface processes).

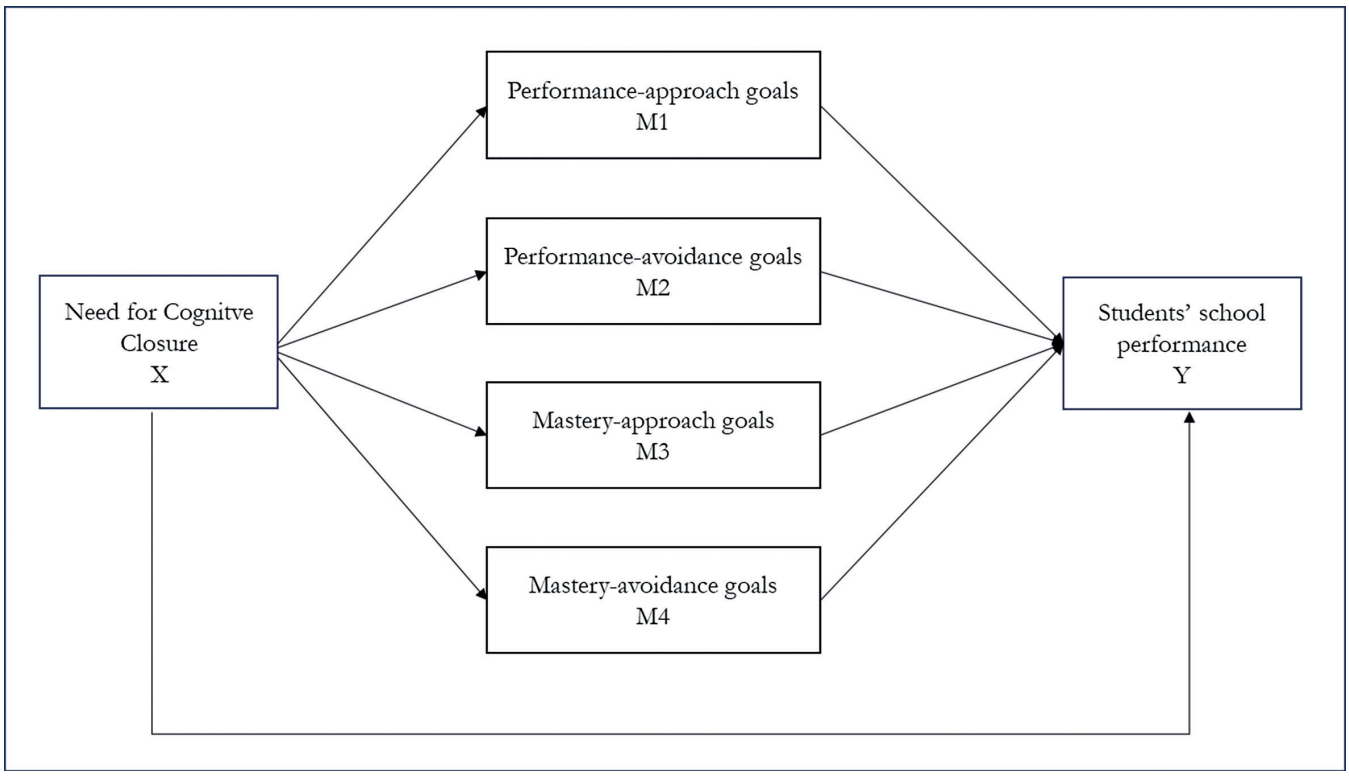
Overall, these studies revealed that high levels of the need for closure lead students to seek external standards (i.e., peer grades) against which to compare their performance (i.e., performance goals). In particular, the need for closure showed positive relationships with performance-avoidance goals, indicating that students with a high need for closure were more likely to avoid failure (avoid doing worse than their peers) than to strive for success. In contrast, the relationships between the need for closure and mastery goals were ambiguous. In this regard, Harlow and colleagues (2011) suggested that students with a high need for closure would be less oriented towards mastery goals, which involve complex cognitive processes and could lead to ambiguity and uncertainty.

In light of these results, NfCC and achievement goals appear valuable constructs explaining students' school experiences (Parisse et al., 2023) and academic outcomes (DeBacker & Crowson, 2006, 2008, 2009; Harlow et al., 2011). However, the role of NfCC in educational contexts is still little explored (DeBacker & Crowson, 2008). In order to overcome these limitations and to investigate the role of epistemic beliefs in students' school adaptation, the present study examined the relationship between NfCC, achievement goals, and academic performance in a group of secondary school students.

Aims and Hypotheses

This study aimed to examine the impact of NfCC on students' motivation and academic achievement by testing the path analysis model shown in Figure 1. In particular, unlike previous studies (DeBacker & Crowson, 2006, 2008, 2009; Harlow et al., 2011), we investigated the relationships between NfCC and academic outcomes using the 2X2 model of the AGT (Elliot, 1999; Elliot & McGregor, 2001; Pintrich, 2000b), in which avoidance dimensions are included for both performance and mastery goals. Furthermore, because we were interested in investigating the relationship between dispositional variables (i.e. NfCC) and achievement goals, a topic that has not yet been adequately addressed in the literature, context-free measures of the need for closure were used (cfr. DeBacker & Crowson, 2009). Based on the literature presented above, the following hypotheses were developed:

Fig. 1. Conceptual model



Hypothesis 1 (H1): NfCC will be positively associated with performance-approach goals. We hypothesise that the need to achieve certainty typical of NfCC induces students to give greater importance to clear parameters for evaluating and achieving success, i.e. academic performance, and thus pursue performance-approach goals.

Hypothesis 2 (H2): NfCC will be positively associated with performance-avoidance goals. Also in this case, we hypothesise that the need for certainty typical of NfCC leads students to seek parameters against which to compare their performance and, consequently, to work at school not to perform worse than others.

H1 and H2 are consistent with the literature presented above according to which individuals with this epistemic motivation are driven to achieve goals (Kruglanski & Webster, 1996) while actively avoiding failures (Cohen et al., 1955).

Hypothesis 3 (H3): NfCC will be negatively associated with mastery-approach goals. In line with previous studies that have examined the relationships between the need for closure and achievement goals using AGT's trichotomous model, we hypothesise that the need to achieve certainty, typical of NfCC, will lead students to avoid mastery goals, that require efforts and internal standards to assess success.

Regarding the relationship between NfCC and mastery-avoidance goals and between NfCC and school performance, exploratory analyses were carried out. Indeed, the studies conducted so far on the need for closure and achievement goals have not considered mastery-avoidance goals but have been based on the AGT's trichotomous model, in which the avoidance dimension is only foreseen for performance goals. Similarly, no studies have assessed the relationship between NfCC and students' academic performance.

Hypothesis 4 (H4): Performance-approach goals will be positively associated with students' academic performance.

Hypothesis 5 (H5): Mastery-approach goals will be positively associated with students' academic performance.

Hypothesis 6 (H6): Performance-avoidance goals will be negatively associated with students' academic performance.

Hypothesis 7 (H7): Mastery-avoidance goals will be negatively associated with students' academic performance.

Based on the literature presented above, we therefore hypothesised that the approach dimensions of achievement goals would be positively associated with students' academic performance, as they generally predict positive academic outcomes. Conversely, we hypothesised that the avoidance dimensions of achievement goals would be negatively associated with students' academic performance, as they generally predict maladaptive academic outcomes.

Hypothesis 8 (H8): NfCC will be associated with students' academic performances via performance-approach goals, performance-avoidance goals, and mastery-approach goals (mediation hypothesis). In line with the studies of DeBacker, Crowson and Harlow (DeBacker & Crowson, 2006, 2008, 2009; Harlow et al., 2011), we hypothesised that achievement goals are mechanisms capable of explaining the relationships between NfCC and student achievement.

Materials and Methods

Participants and Procedure

Participants were recruited at a secondary school in Italy (from 9th to 13th grade). Eight hundred and sixty students

participated in the study (48 classes). Two students did not provide information about their age. The final sample comprised eight hundred fifty-eight students (*M* age = 16.65, *Min* = 14 years, *Max* = 21 years, *SD* age = 1.60, 57.9% boys, 40.7% girls, 1.4% non-binary).

Before beginning the study, written informed consent was obtained from parents/guardians for the participation of minor students. The adult students (> 18 years) independently participated in the research. Students received details on the research's objectives, methodologies, and instruments before completing the questionnaire. Participation was voluntary, and students were informed that they could stop the compilation at any time without providing reasons. The collection occurred during school hours. All methods and instruments used in this research are in accordance with ethical standards for psychological research and have been approved by the university ethics committee.

Measures

Need for Cognitive Closure Scale. NfCC was evaluated using 14 items from the Need for Cognitive Closure Scale (Pierro & Kruglanski, 2005). Students responded on a 6-point Likert scale (α = .68, ω = .70).

Achievement Goals. Students' achievement goals were measured using 12 items adapted from Elliot and McGregor's (2001) (for the factor structure of the Italian translation of the measure, see Cecalupo et al., 2022). Students responded on a 5-point Likert scale. Each dimension showed acceptable to good levels of reliability (Performance-approach goals: α = .92, ω = .92; Performance-avoidance goals: α = .83, ω = .83; Mastery-approach goals: α = .75, ω = .75; Mastery-avoidance goals: α = .78, ω = .79).

Academic performance. Students' academic performance (grades) was evaluated through one item to which students responded using a 10-point Likert scale that allowed them to indicate the average grades in all school subjects.

Results

Before starting the analyses, we conducted preliminary data analyses (Tabachnick & Fidell, 2018). Subsequently, we examined descriptive statistics and bivariate correlations. Finally, we tested a path analysis model wherein NfCC was inserted as independent variable (X), achievement goals (M1 = Performance-approach; M2 = Performance-avoidance; M3 = Mastery-approach; M4 = Mastery-avoidance) as mediators, and academic performance (Y) as dependent variable (Figure 1). All analyses were conducted using jamovi software (The jamovi project, 2022).

Given the nested nature of the data examined (students nested within classrooms), before proceeding with the analyses, we assessed whether it was necessary to use a multilevel design (Kenny et al., 2002). Therefore, the Intraclass Correlation Coefficient (ICC) was calculated for each variable. The results showed that the ICC values ranged from .006 to .04. Consequently, analyses were conducted treating the data at the individual level, as ICC values indicated that multilevel analysis would be of little benefit (Stapleton, 2013; Stapleton et al., 2016).

The descriptive statistical analysis revealed that all the variables had a normal distribution, with kurtosis and skewness values ranging from -0.904 to -1.312. Table 1 shows the results of the correlations and the descriptive statistics.

Regarding the gender differences, the analyses of variance showed that girls (*M* = 4.14, *SD* = .65, *N* = 350) declared higher levels of mastery-approach goals than boys (*M* = 3.74, *SD* = .82, *N* = 498): $F(2, 857) = 29.301$, $p < .001$, $\eta^2p = .06$. A similar pattern of relationships emerged for mastery-avoidance goals, wherein girls reported higher levels (*M* = 3.75, *SD* = .81, *N* = 350) than boys (*M* = 3.12, *SD* = .93, *N* = 498): $F(2, 857) = 52.676$, $p < .001$, $\eta^2p = .11$. No significant gender differences were observed in performance goals, both in terms of the approach and avoidance dimensions. These findings partially confirm the studies conducted on gender differences in achievement goals, which have found that girls are generally more likely than boys to pursue mastery goals. However, the findings are still unclear and require further investigation (e.g., Wirthwein et al., 2020). The results for students who identified as "non-binary" are reported but not commented on due to their small numbers: mastery-approach goals (*M* = 3.72, *SD* = .69, *N* = 12); mastery-avoidance goals (*M* = 3.17, *SD* = .77, *N* = 12); performance-avoidance goals (*M* = 3.06, *SD* = 1.30, *N* = 12).

The path analysis model's results are presented in Table 2 (see also Figure 2). Given the relationships between the demographic and other variables considered in this study (NfCC, achievement goals and academic performance), gender and age were included as covariates in the path analysis

Tab. 1. Descriptive Statistics and Correlations Results

	M	DS	1	2	3	4	5	6	7
1-NfCC	3.430	.562	-						
2-PAP	2.743	1.086	.071*	-					
3-PAV	2.992	1.106	.229***	.497***	-				
4-MAP	3.899	.778	-.004	.212***	.087*	-			
5-MAV	3.380	.931	.100**	.099**	.186***	.516***	-		
6-Academic performance	7.338	.907	-.134***	.288***	-.017	.197***	-.017	-	
7-Age	16.650	1.602	-.016	-.105**	-.161***	-.156***	-.075*	.075*	-

*Note. * p < .05, ** p < .01, *** p < .001; NfCC = Need for Cognitive Closure; PAP = Performance-Approach; PAV = Performance-Avoidance; MAP = Mastery-Approach; MAV = Mastery-Avoidance*

model. Regarding the gender dimension, the non-binary gender category was not included in the analyses due to the small sample size. The gender variable was thus considered as a dummy variable. In addition, considering the correlations found between the achievement goals (Table 1), their covariances were also estimated in the model.

In the path analysis model, NfCC was positively associated with performance-avoidance goals (B = .231, SE = .06, p < .001). Positive but lower relationships also emerged between NfCC and performance-approach goals (B = .08, SE = .07, p = .031) and between NfCC and mastery-avoidance goals (B = .10, SE = .06, p = .004). However, no significant associations were found between NfCC and mastery-approach goals. NfCC was negatively associated with students' academic performance (B = -.12, SE = .05, p < .001). Regarding the achievement goals, performance-approach (B = .35, SE = .03, p < .001) and mastery-approach goals (B = .20, SE = .04, p < .001) were positively related to students' academic performance. On the contrary, results showed negative associations between performance-avoidance goals and students' academic performance (B = -.15, SE = .03, p < .001) and between mastery-avoidance goals and students' academic performance (B = -.13, SE = .04, p < .001). The results of the indirect effects (table 3) revealed that NfCC was associated with students' academic performance through performance-approach goals (B = .03, SE = .02, *CI 95%:* .004; .084), performance-avoidance goals (B = -.03, SE = .02, *CI 95%:* -.090; -.027), and mastery-avoidance goals (B = -.01, SE = .01, *CI 95%* = -.044; -.005). The overall model explained 17.6% of the variance in students' academic performance.

These results require some consideration. In particular, in the path analysis model (see Table 2), performance- and mastery-approach goals showed positive associations with students' academic performance, while the association between students' academic performance and performance- and mastery-avoidance goals was negative. However, correlation analyses (see Table 1) indicated that performance- and mastery-avoidance goals were not significantly associated with students' academic performance. Therefore, the relationships between achievement goals and academic performance changed when performance and mastery goals (both approach and avoidance dimensions) were considered together in the path analysis model. This suggests the presence of a suppression effect, that is, the presence of predictors (in

Tab. 2. Path Analysis Results

Dependent variable	Predictor	*B*	*SE*	*p-value*
Performance-approach goals				
	Need for Cognitive Closure (NfCC)	**.075**	.068	.031
	Gender	.006	.075	.868
	Age	**-.106**	.024	.002
Performance-avoidance goals				
	Need for Cognitive Closure (NfCC)	**.231**	.064	<.001
	Gender	**-.068**	.074	.041
	Age	**-.102**	.022	<.001
Mastery-approach goals				
	Need for Cognitive Closure (NfCC)	-.003	.051	.933
	Gender	**-.241**	.050	<.001
	Age	**-.139**	.016	<.001
Mastery-avoidance goals				
	Need for Cognitive Closure (NfCC)	**.099**	.058	.004
	Gender	**-.326**	.060	<.001
	Age	-.047	.019	.160
Students' school performance (SSP)				
	Need for Cognitive Closure (NfCC)	**-.116**	.054	<.001
	Performance-approach goals (PAP)	**.352**	.031	<.001
	Performance-avoidance goals (PAV)	**-.148**	.030	<.001
	Mastery-approach goals (MAP)	**.202**	.042	<.001
	Mastery-avoidance goals (MAV)	**-.132**	.038	<.001
	Gender	**-.073**	.061	.027
	Age	**.122**	.018	<.001

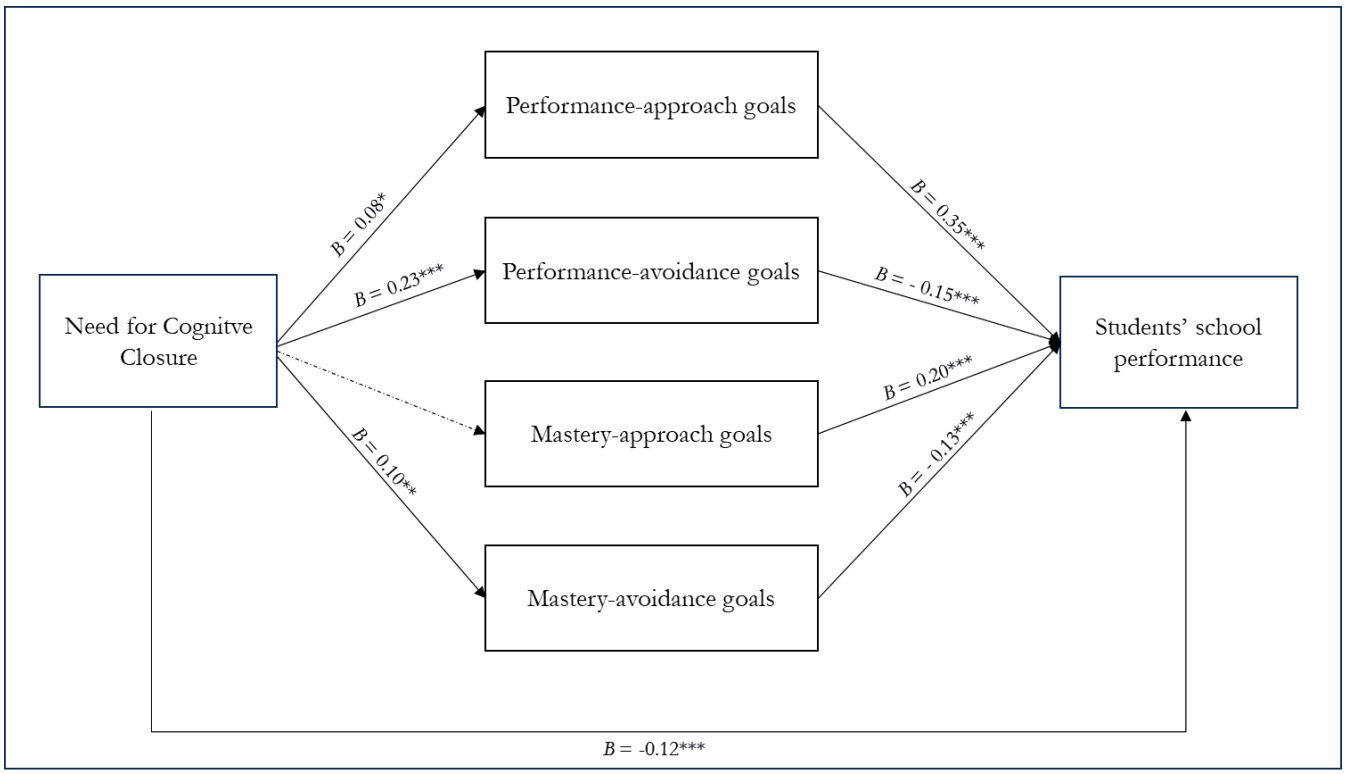
Note. Significant relationships are in bold.

Tab. 3. Indirect effects

Indirect Effect	Effect	BootSE	BootLLCI	BootULCI
NfCC→PAP→SSP	**.026**	.019	.004	.084
NfCC→PAV→SSP	**-.034**	.016	-.090	-.027
NfCC→MAP→SSP	-.001	.012	-.026	.023
NfCC→MAV→SSP	**-.013**	.010	-.044	-.005

Note: NfCC = Need for Cognitive Closure; PAP = Performance-approach goals; SSP = Students' school performance; PAV = Performance-avoidance goals; MAP = Mastery-approach goals; MAV = Mastery-avoidance goals

Fig. 2. Path analysis model's results



*Note: *p<0.05; ** p<0.01; *** p<0.001*

our case, performance- and mastery-avoidance goals) that, although not correlated with the criterion variable, may be associated with it when variables that influence this relationship (in our case, performance- and mastery-approach goals) are included in the regression model (Kline, 2016; Maassen & Bakker, 2001; MacKinnon et al., 2000) [1]. Looking at these results from the perspective of the 2 (performance vs mastery) x 2 (approach vs avoidance) goal model (Elliot, 1999; Elliot & McGregor, 2001; Pintrich, 2000b), it appears that the approach-avoidance factor plays a crucial role in predicting academic performance. Furthermore, the results of the correlations (Table 1) and regressions (Table 2) highlighted the presence of stronger associations between NfCC and the avoidance dimensions of the achievement goals compared to the approach dimensions, implying that students with a high need for closure seem more motivated to avoid failure than to pursue educational goals actively. Taken together, these findings suggest that when studying the predictors and outcomes of achievement goals, particular attention should be paid to approach-avoidance dimensions, in addition to the classic performance-mastery dichotomy.

For these reasons, two alternative path analysis models were evaluated. In both models, NfCC was entered as a predictor, and students' academic performance was entered as the dependent variable. However, in the first model, the mediators of the relationship between NfCC and students' academic performance were the achievement goals in the approach and avoidance dimensions, without distinguishing between performance and mastery goals. Instead, in the second model, the mediators of the relationship between NfCC and students' academic performance were performance and mastery goals, without distinguishing between the approach and avoidance dimensions. The results of the models are presented in the following paragraph.

Alternative Models' Results

In the first model, NfCC was entered as a predictor, achievement goals (approach and avoidance dimensions) as mediators and students' academic performance as a dependent variable. Age and gender were added as covariates. The results indicated that NfCC was positively associated with the avoidance dimensions of achievement goals (B = .22, SE = .05, p < .001), which in turn were negatively associated with students' academic performance (B = -.22, SE = .04, p < .001). No significant associations emerged between NfCC and the approach dimensions of the achievement goals (B = .05, SE = .04, p = .144). The indirect effect of NfCC on students' academic performance through the avoidance dimensions of achievement goals was significant and negative (B = -.08, SE = .02, *CI 95%:* -.116; -.047), net of the positive associations of approach dimensions of achievement goals with students' academic performance (B = .44, SE = .05, p < .001). NfCC also negatively affected students' academic performance (B = -.11, SE = .05, p = .001). The overall model explained 17.4% of the variance in students' academic performance.

In the second model, NfCC was entered as a predictor, performance and mastery goals were entered as mediators and students' academic performance as a dependent variable. Age and gender were added as covariates. The results indicated that NfCC was positively associated with performance goals (B =

.18, *SE* = .06, *p* < .001), which in turn were positively associated with students' academic performance (*B* = .19, *SE* = .03, *p* < .001). The indirect effect of NfCC on students' academic performance through performance goals was significant and positive (*B* = .03, *SE* = .01, *95% CI* [.028, .085]). Mastery goals were not associated with either NfCC (*B* = .06, *SE* = .05, *p* = .060) or students' academic performance (*B* = .07, *SE* = .04, *p* = .054). NfCC also showed a negative direct effect on students' academic performance (*B* = -.18, *SE* = .06, *p* < .001). The overall model explained 7.1% of the variance in students' academic performance.

Discussion

The present research explored how NfCC potentially influences academic motivation and impacts students' performance. Previous studies suggested a positive association between the need for closure and performance-avoidance goals (DeBacker & Crowson, 2006, 2008, 2009), while indicating uncertain associations with performance- and mastery-approach goals (DeBacker & Crowson, 2006, 2008, 2009). According to Harlow et al. (2011), mastery goals involve complex mental processes and introduce uncertainty by setting personal benchmarks to achieve educational goals. In contrast, performance goals rely on external standards, providing a sense of certainty in reaching educational objectives. In other words, students who strongly prefer certainty regarding course content are driven to avoid appearing academically incompetent but do not embrace adaptive behaviours like pursuing mastery goals and employing deep cognitive strategies (Harlow et al., 2011).

Based on these insights, we explored how NfCC and achievement goals are related to each other in explaining students' academic success. In particular, we hypothesised that NfCC would show positive associations with performance-approach goals (H1) and performance-avoidance goals (H2). On the other hand, we hypothesised that NfCC would be negatively associated with mastery-approach goals (H3). In addition, we hypothesised that performance-approach goals (H4) and mastery-approach goals (H5) would be positively associated with students' academic performance (grades), as they generally predict positive academic outcomes. Conversely, we hypothesised that the avoidance dimensions of performance goals (H6) and mastery goals (H7) would be negatively associated with students' academic performance, as they generally predict maladaptive academic outcomes. Finally, we hypothesised that the NfCC was associated with students' academic performances via performance-approach, performance-avoidance, and mastery-approach goals (H8). Considering the limited research on this topic, the analyses regarding the relationships between NfCC and mastery-avoidance goals and between NfCC and academic performance were exploratory. To test our hypotheses, we ran a path analysis model wherein we designated NfCC as the independent variable, the achievement goals as parallel mediators, and students' academic performance as the dependent variable. This model allowed us to investigate the relationships among these variables and their collective impact on students' academic performance.

Results partially confirmed our hypotheses (see Table 2). Indeed, NfCC showed significant relationships with various aspects of students' achievement goals and academic performance.

NfCC was positively linked to the performance-approach and performance-avoidance goals, although the association was stronger for the latter. These results confirm H1 and H2, suggesting that students driven by the need for certainty in educational attainment tend to emphasise both reaching success and avoiding failure concerning defined parameters. Our findings indicated an interesting distinction between mastery-approach and mastery-avoidance goals regarding their link with NfCC. Specifically, we found a positive association between NfCC and mastery-avoidance goals. Unlike what was hypothesised in H3, NfCC and mastery-approach goals appeared as independent constructs. Therefore, NfCC has no relationship with motivational orientations associated with a broad range of adaptive outcomes, such as mastery-approach goals. Overall, these findings demonstrated that avoidance dimensions were more strongly associated with NfCC than the approach.

Concerning the relationships between achievement goals and students' academic performance, the present study confirmed what has been widely demonstrated in the literature regarding the adaptive outcomes associated with performance- and mastery-approach goals. Indeed, they were positively associated with students' academic performance. H4 and H5 were therefore confirmed. In contrast, performance- and mastery-avoidance goals emerged as factors hindering success as they were negatively associated with students' academic performance. H6 and H7 were therefore also confirmed.

As hypothesised in H8, findings showed that NfCC was linked to students' academic performance through performance-avoidance goals, performance-approach goals, and mastery-avoidance goals. Interestingly, the indirect relationship between NfCC and students' academic performance appears to follow different paths. When performance- and mastery-avoidance were considered mediators, the indirect relationship between NfCC and students' academic performance was negative. This means that students with high NfCC tend to pursue maladaptive motivational goals that represent an obstacle to achieving high academic performance. On the contrary, the indirect relationship between NfCC and students' academic performance through performance-approach goals was positive. Students with high NfCC can also pursue performance-approach goals, which have a positive relationship with students' academic achievement. However, the relationship between NfCC and performance-approach goals was small, and further investigation is needed.

Regardless of the role of achievement goals, NfCC was negatively directly associated with students' academic performance. Although there is a lack of literature on the topic, based on these results, it is possible to hypothesise that the processes that characterise NfCC – i.e. the tendency to seek «an answer to a given question, any answer» (Kruglanski, 1990; p. 337) in order to avoid confusion and ambiguity – reduce students' ability to engage in complex information processing, thereby impairing learning and consequently performance (DeBaker & Crowson, 2006). However, further research is needed to identify other mediating or moderating factors involved in these processes.

We evaluated two alternative path analysis models to better understand the relationships that emerged between NfCC and the avoidance dimensions of achievement goals. In one model, we included the approach/avoidance dimensions (without distinguishing between performance and mastery goals) as mediators between NfCC and students' academic performance. The results showed that the association between NfCC and students' academic performance was only mediated by avoidance goals. In another model, we examined how performance and mastery goals (without distinguishing between the approach and avoidance dimensions) mediated the association between NfCC and students' academic performance. The results showed that the association between NfCC and students' academic performance was only mediated by performance goals. Another interesting finding was that the explained variance of students' academic performance was approximately 17% when the path analysis model included the approach and avoidance dimensions of achievement goals. The explained variance of students' academic performance decreased to 7% when mastery and performance orientations were considered. These findings, in addition to confirming the limitations of the dichotomous model of AGT (performance goals vs. mastery goals), suggested that avoidance dimensions are crucial in explaining the association between NfCC and students' academic success. Students with NfCC seem to be motivated to avoid failure to a greater extent rather than actively pursue educational goals. Consequently, high levels of NfCC may represent a risk factor for school adaptation as they are associated with maladaptive motivational orientations (i.e. performance- and mastery-avoidance goals). These preliminary findings need further confirmation, especially about the relationship between NfCC and mastery-avoidance goals. Indeed, to the best of our knowledge, this is the first study to examine the relationships between these constructs. Particularly, mastery-avoidance goals are a complex and under-researched source of motivation and further studies based on the 2x2 goal model (Elliot, 1999; Elliot & McGregor, 2001; Pintrich, 2000b) are needed to shed light on its predictors. Our research suggests that a dual perspective could be adopted when studying achievement goals' predictors and outcomes, paying particular attention to the approach-avoidance dimensions beyond the performance-mastery dichotomy.

Overall, these results show that if, on the one hand, NfCC can be a risk factor for students' academic performance, on the other hand, the motivational dimensions play a crucial role in explaining the relationships between NfCC and academic performance. In fact, it seems that individuals with a strong need for closure use achievement goals in different ways to avoid ambiguity and achieve their goals. For students with high NfCC, having clear benchmarks (performance dimensions) rather than relying on uncertain internal parameters (mastery dimensions) could improve academic performance. At the same time, the association between NfCC and the avoidance dimensions of achievement goals could harm students' academic performance.

These findings need to be explored further, but they open the way to a line of research in educational psychology in which epistemic motivations should be considered as a factor involved in learning processes.

Limitations and conclusions

Current research is restricted by some general limitations. First, this study employs a cross-sectional design that precludes making causal inferences about the relationships between the variables under consideration. Moreover, it does not provide insights into the evolution of the examined variables over time, presenting a potential avenue for future investigations that can explore how these dynamics unfold and change longitudinally, shedding light on the developmental trajectory of NfCC's influence on academic motivations and performance. Furthermore, forthcoming studies could delve further into additional potential mediators or moderators in the association between NfCC and academic performance, thus providing a more comprehensive understanding. Additionally, the participant pool was exclusively composed of Italian students. While this enhances national studies, broadening the scope to encompass diverse cultural contexts could yield comparative insights. Finally, none of the measures used in this study have been validated in the Italian context, except for the NfCC scale. It would be advantageous to design studies to improve the psychometric properties of the variables used in this investigation.

Overall, the present study shows how NfCC can act as a forecaster of academic success. We argue that examining the influence of epistemic motivations on the dynamics of teaching and learning could provide a more nuanced grasp of the mechanisms steering students' educational pathways. Future research endeavours could extend this study's findings, contributing significantly to our understanding of how cognitive tendencies shape educational achievements across diverse populations and contexts.

Footnotes

[1] Partial correlations' results confirm this hypothesis. In particular, a partial negative correlation emerged between performance-avoidance goals and students' academic performance ($r = -0.19$, $p < 0.001$) controlling for performance-approach goals. Similarly, a partial negative correlation emerged between mastery-avoidance goals and students' academic performance ($r = -0.14$, $p < 0.001$) controlling for mastery-approach goals. The correlations had thus concealed the true relationships between the avoidance dimensions of achievement goals and students' academic performance that emerged once suppression effects were controlled in the analyses (Kline, 2016).

Ethical approval

The research complies with the Ethical Code of the Italian Association of Psychology and has been approved by the Ethical Committee of the University of Cagliari.

Data availability statement

The participants of this study did not give written consent for their data to be shared publicly, so data is not available.

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Authors' contribution
M.M.: Conceptualization, Methodology, Data collection, Formal analysis, Investigation, Writing – original draft, Writing – review & editing.
C.P.: Data collection, Formal analysis, Investigation, Writing – review & editing.
L.P.: Data collection, Formal analysis, Investigation, Writing – review & editing.
S.L.: Conceptualization, Methodology, Formal analysis, Writing – review & editing.

Declaration of Conflicting Interests
The authors declare that they have no competing interests.

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