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**PREDICTING ALGERIAN DOCTORAL STUDENTS' ACADEMIC
BURNOUT USING THE EXPECTANCY-VALUE MODEL:
THE EFFECT OF FACULTY ATTACHMENT AND YEARS OF
ENROLMENT**

Rida Sellali*	Faculty of Letters and Languages, University of Mustapha Stambouli, Mascara, Algeria	redha.sellali@univ-mascara.dz
Nour El Houda Lahiouel	Faculty of Arts, Humanities, and Social Sciences, University of Limerick, Limerick, Ireland	Nour.Lahiouel@ul.ie

* Corresponding author

ABSTRACT

Aim/Purpose	The purpose of the current study is to investigate the effect of expectancy-value beliefs on Algerian doctoral students' academic burnout. Descriptive-inferential research was adopted to measure the potential association and predictive relationship between the variables of the study.
Background	It is commonly known that candidates undertaking a doctoral course experience significant amounts of pressure for the sake of finishing their doctoral programmes. However, their expectations of success and course values, which stem from the very essence of motivation theory, are assumed to be connected to their experience of academic burnout.
Methodology	Quantitative research methods were used to study the relationship between the variables of the study. Through snowball sampling, the sample of the study consisted of doctoral students (N= 104) from three different Algerian universities, representing five faculties (Nature and Life Sciences, Science and Technology, Maths and Computer Sciences, Economy, and Languages and Literature). The measures used in this study are adapted versions of the Students' Expectations and Value Beliefs Survey, and the Maslach Burnout Inventory – Students' Survey (MBI-SS).
Contribution	This study attempts to expand on the existing literature on the rather new concept of student burnout through the inclusion of the expectancy-value variables

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	and offers practical recommendations to practitioners, supervisors, and doctoral students alike.
Findings	The findings indicated the existence of significant differences between doctoral candidates in terms of their faculty attachment and years of enrolment in their respective courses. The study also revealed the existence of significant negative correlations between the dimensions of expectancy-value and academic burnout. Students' success expectancy and course values were significant negative predictors of Algerian doctoral students' academic burnout.
Recommendations for Practitioners	Supervisors are recommended to equip their doctoral supervisees with realistic expectations of the required abilities of the course right from the beginning, elaborate on the abilities needed to finish their respective doctoral programmes, and regularly remind them of the values of their programmes should they experience academic burnout.
Recommendations for Researchers	The present study relies heavily on quantitative research methods. Researchers could expand on the same topic of the current study by examining the subjective inclinations of doctoral candidates to understand more about the association of their success expectancy and course values to their experience of academic burnout. Researchers could also expand on the sample of the study in different contexts in the world to add more constructive criticism to the current study, with better probability sampling techniques.
Impact on Society	The current study seeks to raise awareness on the importance of doctoral candidates' perception of their respective doctoral programmes and potentially decrease failure and dropout rates by shifting focus to the regulation of their perceived success expectations and course values.
Future Research	As far as future research is concerned, several other variables may more or less be associated with the concept of academic burnout within doctoral students, at least in the Algerian higher education context, such as candidates' physical and emotional engagement, employment opportunities, and supervision satisfaction. Expectancy-value may have a moderating role in the relationship of these variables with experience of academic burnout, all of which can be studied through Structural Equation Modelling.
Keywords	academic burnout, expectancy-value, doctoral students

INTRODUCTION

Algerian doctoral students in different academic domains usually encounter a variety of obstacles during their enrolment years before graduation. It is only natural to assume that, due to academic pressure, doctoral candidates would frequently experience academic burnout. Several factors may cause doctoral students to be inefficient in achieving regular advancement in dissertation writing, become detached from their studies, and ultimately feel emotionally exhausted. These factors may more or less revolve around the lack of motivation, unmet expectations, lack of systematic and efficient supervision, difficulties in publishing scientific articles in relevant journals as requirements of graduation, low employment expectancy after graduation (Nagy et al., 2019), and overestimations and/or lack of academic competencies needed to complete a doctoral programme. In addition, the interest doctoral students have in their fields of study has a significant impact on how well their studies go as well as the quality of their doctoral experience (Grover, 2007; Pyhältö et al., 2020). There are several

intrinsic and/or extrinsic reasons that clarify why doctorate candidates begin and complete their doctoral studies (Brailsford, 2010). These motives include the emotional and value-related implications that postgraduate students associate with pursuing a doctoral programme.

Motivation varies among doctoral candidates, as does the personal significance of the programme ascribed to the doctoral endeavour (operationalized as expectancy-value in the current study). Students' expectations from their doctoral projects reveal their beliefs, goals, and ideas about what it means to be an academic and how to conduct research (Stubb, et al., 2012). Perceived expectancy can be seen here as a key regulator of the doctoral process because it also connects to many choices and judgments, such as what students believe to be worth pursuing during their studies and what acts as a hinderance (Stubb et al., 2012). The relationship between expectation of success, value-related motives for undertaking a doctoral programme, the number of years spent in the course, and discipline-related studies (faculty attachment), as well as how these characteristics contribute to predicting postgraduate students' well-being and burnout, has rarely been the subject of prior research. Thus, this study adds to the body of knowledge about how doctoral students from different higher education institutions in Algeria approach doctoral studies. Additionally, it provides more in-depth assessments of the extent to which doctoral students associate their success expectancies and course values with the factors of academic burnout.

The aforementioned reasons may have different negative effects on doctoral candidates such as a significant delay in graduation, if not dropping out of the programme. Doctoral candidates differ in their success expectations during their enrolment years, and in the way in which they value their respective doctoral programmes, which, in turn, may prompt their experience of academic inefficacy, detachment, and exhaustion. Hence, this study aims to investigate the effect of doctoral students' success expectations and course value on their feeling of academic burnout to ultimately expand and reinforce on the existing literature on students' burnout in academic settings. This entails the systematic analysis of the objectives of the study, which are as follows:

- Highlighting the differences between Algerian doctoral students in terms of experienced academic burnout.
- Measuring the potential significant associations between the dimensions of the expectancy-value model and academic inefficacy, cynicism, and exhaustion within Algerian doctoral students.
- Assessing the predictive relationships between expectancy-value and experienced burnout within Algerian doctoral students.

LITERATURE REVIEW

ACADEMIC BURNOUT

Burnout was first introduced by Freudenberger (1974) as a negative occupational condition that affects and is limited to those who work in service industries. Workplace burnout has been recognised as a real topic deserving of academic examination due to the development of theoretical models and ongoing research (Leiter et al., 2014). Maslach and Jackson (1984) expanded on this concept through the inclusion of three dimensions of occupational burnout: emotional exhaustion, cynicism, and personal accomplishment. Because students' academic commitments might resemble workplace settings to a considerable extent, the term "burnout" has been reinterpreted to include academic settings (Schaufeli et al., 2002). Academic burnout can be seen here as a continuation of career burnout in the sense that students who undergo an educational process exhibit emotional tiredness, a propensity for depersonalization, and a sense of poor personal success due to course stress, course load, or other psychological reasons (Yang, 2004; Zhang et al., 2007). Although students are not employees in the traditional sense, their studies do include scheduled tasks such as attending class and submitting assignments, which might be considered "work" from a psychological standpoint (Lin & Huang, 2014).

Student burnout can thus be understood as an experience of exhaustion caused by high study demands, feelings of ineptitude and/or inefficacy in educational settings, and a sense of disconnection from one's studies (Derakhshan et al., 2022; Yang, 2004).

The concept of burnout has been dissected in research into three factors: inefficacy, cynicism, and emotional exhaustion (Bresó et al., 2007; Maslach & Jackson, 1984). That is, in academic settings, inefficacy refers to a decrease in beliefs of competence and accomplishment, cynicism is defined as a negative or abnormally distant attitude to tasks or individuals, and emotional exhaustion refers to a depletion in feelings relative to task management and accomplishment (Lin & Huang, 2014). In higher education settings, this would be the result of exceedingly demanding study programmes, perceptions of ineptitude as a university student, and detachment from studies (Derakhshan et al., 2022).

Undoubtedly, student burnout has a detrimental impact on the academic quest of every student. Throughout the years, researchers have tried to understand the different factors affecting students' motivation and engagement in educational settings. In university settings particularly, student burnout may have an impact on their current and future connections with their school, as well as their peers, professors, and others, and may also have an impact on the institution's overall reputation among prospective students, with implications for current and future enrolment (Neumann et al., 1990). Furthermore, a plethora of researchers have studied the relationship between burnout and engagement in higher education settings (Mostert et al., 2007; Olwage & Mostert, 2014; Salanova et al., 2010; Schaufeli et al., 2002). Overall, negative associations were found between feelings of burnout and university students' engagement. Significant negative correlations were also found between feelings of academic burnout and the quality of learning experiences (Charkhabi et al., 2013). Investigative interest, which results from tasks that involve the employment of reasoning and logic that appeal to the investigative individual, as well as academic motivation were found to be significant negative predictors of academic burnout (Asieh et al., 2015; Rostami et al., 2012).

As far as graduate-level studies are concerned, Evans et al. (2018, p. 282) studied a sample of 2279 doctoral students from 26 countries, most of whom were from the USA, and reported that "graduate students are more than six times as likely to experience depression and anxiety as compared to the general population." Park et al. (2021) report that 31.3% of doctoral students suffer from depression, 35.4% of them suffer from anxiety, and 41.7% of them suffer from stress. The latter study also highlighted that thesis, dissertation, and other research-related activities are the most prevalent reasons behind experienced psychological distress among doctoral students. One of the reasons associated with this distress is the lack of social support (Pyhältö et al., 2009). Consequently, a significant portion of Ph.D. students drop out before finishing their degrees (Gardner, 2009). For example, an excessive amount of academic burnout in biomedical graduate-level studies as well as the lack of employment opportunities may result in thoughts of dropping out of the programme (Nagy, et al., 2019). The lack of supervision satisfaction was also noted to be one of the causes of burnout among doctoral students (Cornér et al., 2017).

Furthermore, academic burnout could vary among doctoral students in terms of disciplines and/or faculty attachment and the years spent on finishing the programme. Schmidt and Hansson (2018) found that there is a growing number of studies that addressed the well-being of Ph.D. students across various academic disciplines. However, they highlighted that only very few studies addressed potential differences arising from these varieties. According to Åkerlind (2008), academics perceive research as fulfilling a continuum of objectives, from establishing oneself and growing professionally to making contributions to the field. She also states that there is a growing level of understanding of how researchers describe their work in terms of their aims, the research process, expected results, the subject of study, and underlying emotions. Although these perceptions have been researched by academics from many fields at various points in their careers, it is still unclear how differences between disciplines frequently occur. In addition, the timely completion of a doctoral course is deemed essential and can contribute to explaining doctoral students' well-being and experienced academic burnout (Jiranek, 2010). Salmela-Aro and Read (2017) outlined that, out of the three elements of academic

burnout in higher education, cynicism and inefficacy grew steadily over time as polytechnics students' years of enrolment increased. Their result concurs with a cross-sectional study of medical students, which revealed that burnout rises with the length of study (Dyrbye et al., 2006). According to Ried et al. (2006), the academic year was the best predictor for student burnout. Campus connectedness was also found to be influenced by the number of years spent in school (Karhbet, 2015). These reasons have inspired the researchers to examine the differences between doctoral students in terms of faculty attachment and years spent on their doctoral course as explanatory variables to have a clearer view of their perceptions of experienced burnout.

Given the above, a gap has been identified by the researchers as far as motivation theory is concerned; no previous studies have linked doctoral students' experienced burnout with the dimensions of the expectancy-value theory to expand on the existing literature on motivation theory and burnout and to discover more explanatory factors relative to academic burnout within doctoral students, such as faculty attachment and years spent on doing a doctoral programme in Algeria.

EXPECTANCY-VALUE

Understanding individuals' different sources of motivation called for a deeper look into how they expect their actions to be successful and value the tasks in which they engage. During the 1950s, John Atkinson established the Expectancy-Value Theory (EVT) to better understand how people attain their goals (Eccles et al., 1983). He was the first scholar to provide a rigorous mathematical model of how individuals' expectations and values impact their motivation (Rosenzweig et al., 2019). He asserted that an individual's performance on academic assignments is influenced by their general motivation to succeed or avoid failure, expectations of success (i.e., expectancy), and impetus to complete the activity (i.e., task value) (Rosenzweig et al., 2019). Building on Atkinson's (1957) theory of motivation, Eccles et al. (1983) suggested a considerably expanded EVT model. They proposed that students' expectations for success on a task and how much they value it impact how motivated they are to pursue achievement activities. The general construct of the expectancy-value model was determined by Eccles et al. (1983) and consisted of two major factors determining achievement and achievement-related choices: individuals' expectations for success and their subjective task values. Expectancies for success are individuals' expectations of how well they would do on future accomplishment tasks, either in the near or far future (Wigfield & Eccles, 2000). In this sense, expectations refer to a person's confidence and belief in their capacity to complete a task successfully. Students' self-perceptions are a significant element in determining expectations for success.

How an individual perceives their chances of success at a certain task can more or less determine whether or not they would get on with it and how they would go about achieving it. Alternatively, the manner in which individuals perceive the completion of a given task can be defined as their subjective task values. Task values refer to the extent to which a given task is significant, beneficial, rewarding, and/or costly. That is, the motivation behind doing the task may be due to valuing and desiring to perform the task itself (Wigfield & Cambria, 2010). Although individuals' expectations may be a relatively straightforward concept to explain, subjective task values are more complex. Eccles et al. (1983) categorised task value into four sub-categories: attainment value, intrinsic value, utility value, and cost value. The attainment value is concerned with the extent to which individuals desire to achieve well on a given task (Eccles & Harold, 1991). For instance, it is important for students with a high sense of attainment value to obtain good grades and achieve well in school. The intrinsic value is the immediate reward of doing a given task, that is, the enjoyment that arises from genuine motivation and interest in doing the task. The utility value is associated with the relevance and/or importance of the outcome resulting from doing a certain task (Gallaa et al., 2018; Guo et al., 2015). Finally, the cost value is related to the cost of doing a given task. For example, engaging in a university programme might be regarded by students as costly if it would take a considerable number of years to finish or if the tuition fee for the course is relatively costly (Jiang et al., 2018).

Several variables have been associated with the expectancy-value theory since its emergence. Naturally, success expectations and task values are positively correlated with each other except for the cost value (Eccles & Wigfield, 1995). Furthermore, it is worth noting that graduate students seeking to be employed in well-paying occupations are more likely to base their enrolment decisions on the graduate employment prospects of certain graduate courses (Gedye et al., 2004). Empirical evidence has been provided that success expectations and subjective value beliefs have a mediator role between self-efficacy and achievement/satisfaction relationships (Doménech-Betoret et al., 2017). The intrinsic value resulting from enjoyment as well as the utility value among high school students in maths and science are associated with academic self-control (Gallaa et al., 2018). Task subjective behaviours were found to be significantly correlated with achievement behaviours among engineering students (Wu et al., 2020). Significant positive associations and predictive relationships were found between the components of the expectancy-value model and university students' metacognitive skills (Sellali & Yahiaoui, 2021). In their study, Cornér et al. (2021) reviewed the literature on the possible motives that stem from doctoral students' interest in completing a doctoral course, and the most prevalent reasons were driven by intrinsic motives such as the understanding and the creation of knowledge, professional development, increasing job opportunities, and getting a raise or a better salary (Guerin et al., 2015; Neves, 2018; Pyhältö et al., 2020; Skakni, 2018; Stubb et al., 2012). Their study resulted in the identification of four different interest profiles for Ph.D. students, namely, high interest profiles, medium interest profiles, developmental, research, and impact interest profiles, and the development and impact interest profiles. They ultimately concluded that students with medium interest profiles demonstrated signs of burnout and considered dropping out of the programme.

Considering the reviewed literature on burnout and expectancy-value, it is safe to claim that motivation theory is closely connected with the experience of academic burnout. Yet, although it has been addressed in research with university students' burnout, there has certainly not been, to date, an in-depth assessment of the different dimensions of success expectancies, as well as the attainment, intrinsic, utility, and cost values of the doctoral course, in relation to academic burnout for doctoral students. This research thus attempts to contribute to the body of research and fill this gap by addressing this topic with Algerian doctoral students.

DESCRIPTION OF DOCTORAL EDUCATION IN ALGERIA

In Algerian doctoral programmes, prospective doctoral students who must have a Master's degree have to participate in a national contest that is held every year in higher-education institutions to secure a place in a Ph.D. position. The number of Ph.D. positions in each department is very limited and ranges between three to six positions on average. After passing the contest, the doctoral training committee proposes themes of research to the new Ph.D. students or allows them to propose their own research topic. Several requirements need to be met to receive the doctorate degree including the attendance of discipline-related research training during the first year of enrolment, participating in national and international conferences, publishing a research paper, and, of course, writing their respective dissertations. Almost no tuition fee is required to finish the programme. Candidates are required to spend at most three years doing their respective doctoral courses. If they fail to finish their research in due time, an extension could be issued for a maximum period of two years with the provision of a valid justification for the delay. After meeting the aforementioned requirements and submitting and successfully defending their theses, candidates receive the title of Doctor of Philosophy.

METHODOLOGY

POPULATION AND SAMPLING

This study targets Algerian doctoral students from different higher education faculties and departments in three different Universities in Algeria (The University of Mustapha Stambouli – Mascara,

the University of Tahri Mohamed – Bechar, and The University of Mestapha Ben Boulaid – Batna). The sample of the study consisted of 104 doctoral students from five different faculties: Nature and Life Sciences (N= 15), Technology (N= 17), Maths and Computer Sciences (N= 21), Economy (N= 23), and Languages and Literature (N= 28). Participants were categorised in terms of their faculty attachment and years of enrolment in their respective doctoral courses: first-year students (N= 35), second-year students (N= 27), third-year students (N = 29), and fourth-year students (N= 13). It is important to note that doctoral students are seldom found around the university campus, which makes considerably difficult to reach out to them with simple random sampling; first-year doctoral students are required to attend research-training sessions, which explains their dominance in terms of sample size, while second-, third-, and fourth-year students can devote their time to research with less frequency of attendance. They can only be found if they attend the library or their respective research laboratories (if any) or if they work at their respective university part- or full-time. Hence the researcher selected the non-probability snowball sampling technique to reach out to the maximum possible number of doctoral students. Although this sampling technique does not allow every possible individual in the target population equal chances of participation, it was, to the best knowledge and belief of the researchers, the most efficient way to target doctoral students from different faculties.

RESEARCH QUESTIONS AND HYPOTHESIS

In line with the aim of the study, the research questions are as follows:

- Is there a significant difference in academic burnout in terms of students' faculty attachment?
- Is there a significant difference in academic burnout in terms of years spent on the doctoral course?
- What is the nature of associations that exist between the constructs of doctoral students' expectancy-value beliefs and their experience of burnout?

Furthermore, in following the intended purpose and the variables of this study, the researchers formulated the following hypothesis:

- Algerian doctoral students' expectancy-value beliefs are significant negative predictors of academic burnout.

MEASURES

For the sake of measurement accuracy of the study variables, the researchers deployed an adapted version of Trautwein et al.'s (2012) Expectancy and Value Beliefs Questionnaire, and the Maslach Burnout Inventory – Students' Survey (MBI-SS) (See Appendix). The Expectancy and Value Beliefs questionnaires were developed by Trautwein et al. (2012), and it was originally meant to measure the expectations and value beliefs of German Maths and English students. The original authors of the questionnaire derived items from different valid sources based on the Expectancy-value model developed by Eccles et al. (1983), which measures students' success expectancy and value beliefs (attainment, intrinsic, utility, and cost values). The questionnaire consists of 16 items, four of which are related to expectancy beliefs, and 12 of which are concerned with the four dimensions of value beliefs. The items of the cost value subscales have been reverse-coded in order to calculate the overall score of the expectancy-value beliefs. Furthermore, the student version of the Maslach Burnout Inventory was validated by Schaufeli et al. (2002). The instrument contains 15 items measuring the three subscales of burnout: cynicism (four items), academic efficacy (six items), and exhaustion (five items). It is important to note that, because the items of the academic efficacy subscale are positively worded, they were reverse-scored in order to measure inefficacy. Both of these instruments are measured on a five-point Likert scale (1= Strongly Disagree, 5= Strongly Agree), and were translated into Arabic by the researchers with the assistance of an official translator since the target population is from Algeria.

The instruments were distributed using Google Forms; doctoral students shared the link to the questionnaire with each other for easier access.

DATA ANALYSIS PROCEDURES

The data of this study were analysed using the SPSS and SPSS AMOS V26. Before engaging in data analysis, the authors assessed the normality assumptions of data distribution for both instruments using the Kolmogorov-Smirnov and Shapiro-Wilk tests of normality, as well as the skewness and kurtosis criteria. Subsequently, a Confirmatory Factor Analysis (CFA) was conducted to assess the overall goodness-of-fit indices of the research instruments in the Algerian context. This includes the calculation of the ratio of Chi-Square to the degrees of freedom (χ^2/df), the Good Fit Index (GFI), the Comparative Fit Index (CFI), and the root mean square error of approximation (RMSEA). The researchers determined the construct validity of the instruments of the study. That is, factor loadings were assessed in the structural equation model (SEM) in AMOS for convergent validity; considering the sample size, a value of .55 was the lowest acceptable value for acceptable factor loadings (Marsh & Hocevar, 1985). The Fornell-Larcker Criterion (Fornell & Larcker, 1981) was used to compare the Average Variance Extracted (AVE) of each latent variable in both instruments to the correlation with other latent variables; if the square root of AVE exceeds any other correlation with a different latent variable, discriminant validity is confirmed. The researchers then assessed the internal consistency of the participants' responses using Cronbach's Alpha coefficient. In order to answer the research questions, the researchers ran a series of statistical tests in SPSS.

Prior to conducting the required statistical analyses to answer the research questions and test the hypothesis of this study, it is of crucial importance to check for normality assumptions of the data distribution in order to select the appropriate types of statistical analyses. The results of the Normality tests for data of this study are shown in Table 1.

Table 1. Normality Distribution Tests for the Data of the Study

Measure	Kolmogorov-Smirnov		Shapiro-Wilk		Skewness	Kurtosis
	df	Sig.	df	Sig.		
Expectancy-Value Model	103	.53	103	.71	-.052	-.009
MBI-SS	103	.59	103	.89	.014	-.217

The results of Table 1 indicate that the data of the study did not violate normality assumptions. Both the Kolmogorov-Smirnov and Shapiro-Wilk tests of normality are statistically insignificant ($p > .05$). The researchers failed to reject the null hypothesis; the data is not significantly different from a normal distribution. The values of skewness and kurtosis are both within the recommended values of normality for both instruments (between -1.96 and 1.96). This strengthens the assumption that the data of the study is normally distributed. Based on these results, the researchers opted for parametric statistical tests to answer the research questions and test the hypothesis of the study. In other words, the differences between participants' faculty attachment and years of enrolment in their doctoral courses in accordance with their expectancy-value beliefs and burnout experience were assessed using analyses of Variance (ANOVA) to determine whether there is a statistical and, by extension, a practical significant difference. The associations between the latent variables of the study were assessed through Pearson's correlation coefficients (r) to answer the third research question, and the variance accounted for in the dependent variables was measured using the value of r^2 . Finally, the predictive associations between the dependent and independent variables were checked using linear regression analysis to test the hypothesis of the study.

FINDINGS

CONFIRMATORY FACTOR ANALYSIS

Furthermore, because of the sensitivity of large sample sizes, and since the measures of the study were not developed nor validated in the Algerian context, CFA was run using SPSS AMOS to test the goodness-of-fit indices of the measures used in this study. Table 2 shows the model-to-data fit indices of the measures of the study.

Table 2. Goodness of Fit Indices for the Models of the Study

	χ^2/df	GFI	CFI	RMSEA
Acceptable fit	<3	>.90	>.90	<.08
Expectancy–Value Model	3.17	.91	.92	.078
MBI-SS Model	2.68	.93	.95	.042

The results of Table 2 indicate that the fit indices of the Expectancy-Value model were not entirely satisfactory ($\chi^2/df = 3.17$; GFI = .91; CFI = .92; RMSEA = .078). However, the χ^2/df test is very sensitive to large sample sizes, in which case the value of < 05 indicates a reasonable fit (Marsh & Hocevar, 1985). On the other hand, the MBI-SS model had acceptable goodness-of-fit to the data ($\chi^2/df = 2.68$; GFI = .93; CFI = .95; RMSEA = .042). Overall, it is safe to assume that both models had adequate model-to-data fits in the Algerian context. In order to check for the construct validity of the measures, the researchers checked for factor loadings in the structural equation models generated by SPSS AMOS. The factor loadings of all observed variables relative to the latent variables of the expectancy-value model (success expectations, attainment value, intrinsic value, utility value, and cost value) ranged from .62 to .81. Since the sample of this study consists of 104 participants, the value of .55 is used the threshold for acceptable loadings (Hair et al., 2013). The factor loadings for the observed variables of the MBI-SS ranged from .71 to .89. This indicates that convergent validity is confirmed by factor loadings. In addition, the discriminant validity of the two measures was assessed using the Fornell-Larcker Criterion.

Table 3. The Fornell-Larcker Criterion of Discriminant Validity for the Expectancy-Value Model

	Success Ex- pectations	Attainment Value	Intrinsic Value	Utility Value	Cost Value
Success Expectations	.75*				
Attainment Value	.22	.85*			
Intrinsic Value	.36	.36	.91*		
Utility Value	.48	.49	.36	.77*	
Cost Value	.55	.27	.42	.33	.79*

*Square Root of AVE

The results shown in Table 3 indicate that all of the latent variables of the Expectancy-Value Model had a higher score of the square root of AVE than any of the correlations with other latent variables. It is safe to say that discriminant validity is confirmed in the expectancy-value model by the Fornell-Larcker Criterion. The results of Table 4 show that the root square of AVE of the three latent variables of the MBI-SS had greater scores than any of the correlations with other latent variables on the scale. This means that discriminant validity is confirmed by the Fornell-Larcker Criterion.

Table 4. The Fornell-Larcker Criterion of Discriminant Validity for the MBI-SS

	Inefficacy	Cynicism	Exhaustion
Inefficacy	.87*		
Cynicism	.34	.79*	
Exhaustion	.49	.21	.89*

*Square Root of AVE

Given the above results, it is concluded that both measures of the study achieved satisfactory results for construct validity. Considering the results of the goodness-of-fit, and construct validity collectively, it is thus confirmed that the expectancy-value model and the MBI-SS are valid instruments of measurement in the Algerian higher education context.

RELIABILITY ANALYSIS

Reliability analyses were run in SPSS to determine the descriptive statistics and internal consistency of the responses to the measures of the study. Because of the sample size, the researchers have adopted an acceptable Alpha coefficient of .70 as the benchmark for internal consistency. Given the results of Table 5, it is thus concluded that both instruments are reliable measures in the Algerian higher education context. Furthermore, doctoral candidates had positive tendencies towards the constructs of the expectancy-value theory except for the cost-value construct, which showed neutral responses. Overall, the responses to the subscales of the MBI-SS demonstrated neutral tendencies.

Table 5. Descriptive statistics and Reliability Analyses for the Subscales of the Measures of Expectancy-Value and Burnout

Subscale	N of Items	Min	Max	M	SD	Cronbach's α
Success Expectancy	4	1	5	3.87	1.08	.82
Attainment Value	3	1	5	3.54	.98	.74
Intrinsic Value	5	1	5	3.76	.75	.71
Utility Value	2	1	5	4.02	.88	.85
Cost Value	2	1	5	3.17	.97	.72
Inefficacy	6	1	5	3.26	.85	.89
Cynicism	4	1	5	3.06	.79	.83
Exhaustion	5	1	5	2.91	1.12	.91

ANALYSES OF VARIANCE

Analyses of variance were used to compare the means in order to determine the differences between doctoral students regarding their experience of burnout in accordance with the faculties to which they belong. Table 6 contains the results of the one-way ANOVA tests for this difference. The results show that there is a statistically significant difference in burnout experiences in terms of faculty attachments [$F(4, 99) = 9.978, p < .05$], with a medium effect size (Eta Squared) explaining 7.9% of the variance in experienced burnout experience. Post Hoc test of multiple comparisons revealed that doctoral students in Technology faculties experienced the most burnout ($M = 3.52, SD = .81$), followed by students from Maths and Computer Sciences ($M = 3.41, SD = .95$) and from the Faculty of Life and Nature ($M = 3.34, SD = 1.03$). There was no significant difference between these three categories except for the mean difference between Technology and Life and Nature Faculties students ($p = .026$). However, the aforementioned three categories were all significantly different ($p < .05$) from students from the faculties of Economy ($M = 3.01, SD = .89$), and Languages and Literature ($M =$

2.98, $SD = 1.11$). Finally, there was no statistically significant difference between students from the Economy and Languages and Literature faculties ($p = .624$).

Additionally, the researchers studied the differences in experienced burnout between participants in terms of their years of enrolment in their doctoral courses (from first- to fourth-year) in order to answer the second research question. The findings indicate the existence of a significant difference between doctoral candidates in terms of their years of enrolment in their respective courses [$F(3, 100) = 5.512, p = .031$], with a very small effect size accounting for 2.1% of the variance in experienced burnout. Fourth-year students experienced significantly ($p = .035$) more burnout than any of the other candidates ($M = 3.23, SD = .75$). Third-year students ($M = 3.01, SD = .98$) experienced more burnout ($p < .05$) than first-year students ($M = 2.71, SD = .104$) and second-year students ($M = 2.81, SD = .84$). There was no significant difference between first- and second-year students ($p = .482$).

Table 6. ANOVA Results of Burnout in Terms of Faculty Attachment
Years of Enrolment

Predictor	Sum of Squares	df	Mean Square	F	Sig.	η^2
Faculty attachment	5.861	4	2.704	9.978	.000	.079
Years of enrolment	1.254	3	1.455	5.512	.031	.021

CORRELATIONAL ANALYSES

In order to determine the associations between the subscales of expectancy-value and experienced burnout, Pearson's correlations were run using SPSS. The results in Table 7 show that all of the expectancy-value model constructs are significantly and negatively correlated (except for intrinsic value and cynicism). The weakest of significant associations of all occurred between the cost value and exhaustion ($r = -.154, p < .05$), and between the attainment value and cynicism ($r = -.27, p < .05$) with small effect sizes ($r^2 = -.023, r^2 = .072$, respectively) explaining a small proportion of the variance. Moderate correlations were observed between success expectancy and all of MBI-SS subscales (ranging from $r = -.424, p < .01$ to $r = -.644, p < .01$) with medium effect sizes (ranging from $r^2 = .17$ to $r^2 = .41$). Attainment value was significantly and negatively correlated with inefficacy ($r = -.391, p < .05$) and cynicism ($r = -.387, p < .01$) with medium effect sizes, explaining 15.2% and 14.9% of the variance respectively. The intrinsic value had the strongest significant and negative correlations with the dimensions of burnout compared to the rest of the variables. It was significantly and negatively correlated with inefficacy ($r = -.663, p < .01$), cynicism ($r = -.615, p < .01$), and exhaustion ($r = -.718, p < .01$) explaining a large proportion of the variance (estimates of effect size ranging from 37.8% to 51% of the variance accounted for). The utility value construct was moderately significantly and negatively correlated with Inefficacy ($r = -.410, p < .01$), Cynicism ($r = -.512, p < .01$), and Exhaustion ($r = -.517, p < .05$). Finally, the cost value was significantly and negatively associated with exhaustion ($r = -.312, p < .01$) and explained 9.7% of the variance, but it was not associated significantly with Cynicism

Table 7. Bivariate Correlations between the Latent Variables of the Study

	Success Expectancy	Attainment Value	Intrinsic Value	Utility Value	Cost Value
Inefficacy	-.553**	-.391*	-.663**	-.410**	-.154*
Cynicism	-.424**	-.387**	-.615**	-.512**	-.485
Exhaustion	-.644**	-.270*	-.718**	-.517*	-.312**

**Significant at the level of .01

*Significant at the level of .05

($r = -.485, p = .267$). Table 8 summarises the general associations between expectancy-value and academic burnout. Both expectancy and value beliefs are significantly and negatively correlated with experienced burnout ($r = -.624, p < .01$; $r = -.674, p < .01$), explaining 39% and 45% of the variance accounted for respectively. These results insinuate that doctoral students who had higher success expectations and task-value beliefs experienced significantly lower rates of burnout.

Table 8. Bivariate Correlations between Expectancy, Value Beliefs, and Academic Burnout

	Expectancy Beliefs	Task-Value Beliefs
Expectancy Beliefs		
Task-Value Beliefs	.249**	
Academic Burnout	-.624**	-.674**

** Significant at the Level of .01

LINEAR REGRESSION ANALYSIS

Simple linear regression analyses were run in SPSS to assess the significant predictive linkage between the expectancy-value model used in this study and doctoral students' experience of academic burnout. Table 9 contains the result of the regression analysis. The results indicate that expectancy-value beliefs are significant negative predictors of academic burnout among Algerian doctoral students [$\beta = -.57, t(102) = 7.03, p < .001$]. This predictive relationship explained 32.9% of the variance in burnout (Adjusted $R^2 = .329$). This means that, for every standard deviation of increase in expectancy-value beliefs of Algerian doctoral students, burnout decreases by a factor of $-.571$.

Table 9. Regression Analysis for the Expectancy-Value Model Predicting Academic Burnout

Model	Unstandardized B	Standardized β Coefficient	t	Sig.
Constant	4.119		15.979	.000***
Expectancy-Value	-.321	-.571	7.033	.000***

Dependent Variable: Academic Burnout

**Significance at the level of .001

DISCUSSION

Doctoral students in Human and Social Sciences, Languages and Literature, History, Economics, and Law faculties seem to have fewer struggles with attainment of a doctoral degree than others from other disciplines. To a considerable extent, their research can be finished without having to attend their institutions except for the first year of enrolment and regular visits to the library and/or their supervisors. Students from Engineering, Maths and Computer Sciences, and Life and Nature faculties, on the other hand, need to attend their respective laboratories to carry out their experiments and have access to materials needed to complete their theses and/or to publish their research papers. According to Stubb et al. (2012, p. 449), "the way students experienced the meaning of the Ph.D. thesis work related to the discipline." Considering the results of the current study, it appears that experiences of academic burnout are more common among doctoral students in exact sciences compared to those other disciplines. However, results tend to differ depending on the context and country under investigation (Grover, 2007; McAlpine & Norton, 2006). This may be due to the academic complexity of STEM domains, and, since doctoral students are expected to create, or at least expand on the existing knowledge, they would find it difficult to synthesise and present new knowledge in their research. The absence of a significant difference between students from the Economy and Languages and Literature Faculties strengthens this claim. This result, however, seems to contradict to some extent with previous literature addressing differences between fields of study and burnout.

Generally, previous research reports that doctoral students from human and social sciences experience more burnout than any other faculties, especially in terms of socialization (Gardner, 2009). Another suggestion for this variance is that publication opportunities may also be a contributing factor to their experiences of burnout; while there is a plethora of journals in the economy, arts, language studies, and human and social sciences, be they in Algeria or all around the world, there are fewer journals in other domains, thereby lowering publication opportunities needed for thesis defence. It is also possible that doctoral students who had higher rates of experienced burnout were affected by the pandemic of Covid-19; students from the Engineering, Maths and Computer Sciences, and Life and Nature faculties had very limited access to laboratories during the lockdown, which might have affected their progress in publishing or thesis-writing. Students from the Economy and Languages and Literature faculties must have had relatively greater opportunities to make decent advancements in their research by working from home. This is in line with the fact that the inability to access campus during lockdown was reported to be detrimental to doctoral students' well-being (Sverdlik, et al., 2022). Donohue et al. (2021) report that the overwhelming majority of doctoral students' culminating progress in their thesis/dissertation work was affected by the pandemic. Overall, these results provide an answer to the first research question. However, a large proportion of the variance in experienced burnout remains unexplained by faculty attachment.

Furthermore, the results of the ANOVA above account for such a small proportion of variance in academic burnout in terms of the number of years spent on the doctoral course. The possibility of failure in completing in due time may cause the candidate to be excluded from the programme if they do not display an acceptable advancement rate in their research (The rate differs from one university to another). This statement is in line with the results of the ANOVA test; the more students spend years in their respective doctoral courses, the more they experience burnout. These findings are especially consistent with the literature (Dyrbye et al., 2006; Salmela-Aro & Read, 2017). However, the largest mean comparison was between first and second-year students collectively and third- and fourth-year students. This could be due to the lack of advancement for the latter collective on either their dissertation writing or the delay in article-publication, which, in turn, would cause excessive feelings of academic inefficacy, cynicism, and exhaustion. Another possible explanation for this difference is, again, the effect of the pandemic of Covid-19; third- and fourth-year doctoral students started their programmes in 2018 and 2019 respectively, and they had to undertake the exceptional global change in the middle of their studies, as opposed to first- and second-year students, who started their programmes in 2020 and 2021 respectively.

It can be observed that success expectancy, as well as the intrinsic and utility values of the doctoral course, had stronger correlations with burnout dimensions than the attainment and cost values; candidates who thought they were good at doing their research and who had greater intrinsic and utility values were the least emotionally drained by their doctoral course. It could be argued that the high central tendency of the intrinsic and utility values in Algerian doctoral students could be justified by high interest profiles, development and impact interest profiles (Cornér et al., 2021), and the scarcity of Ph.D. positions in national contests. The associations are in line with the claim that graduate students' enrolment choices are undeniably based on the employment prospects of the course (Gedye et al., 2004) and that enjoyment of the course is associated with academic self-control (Gallaa et al., 2018). This is indicative of the importance of students' self-confidence, motivation, and the usefulness of the course in reducing doctoral students' experience of burnout. The weak associations of the attainment value with academic burnout urge the researchers to infer that the sense of being high achievers in their doctoral courses is not as important to doctoral students' well-being as the intrinsic and utility values. Moreover, the weak correlations between the cost value and burnout could be justified by (a) students' high perceptions of the intrinsic values and (b) the fact that all doctoral programmes in Algeria are nearly free of charge. The only cost here is the time, effort, and emotional cost (Flake et al., 2015) to get the degree. Hence, the researchers provide an answer for the third and final research question: there are significant negative correlations between all the sub-constructs of doctoral students' expectancy-value beliefs and their experience of burnout, excluding the association

of cost value and cynicism. As far as the predictive linkage is concerned, the more doctoral candidates feel that they are good at their doctoral courses, expect to succeed in finalising their course, feel like they have to achieve well in their research, are motivated, acknowledge the value of their studies, and are accepting of the potential cost of their study, the less they would experience academic burnout. The researchers failed to reject the hypothesis of the study; Algerian doctoral students' Expectancy-value beliefs are significant negative predictors of academic burnout.

Overall, an extent of the proportion of variance unexplained in this study, which is associated with experienced burnout among doctoral students in the literature, might be explained by dropout intentions of the doctoral programme and time to candidacy (Peltonen et al., 2017), employment opportunities (Nagy, et al., 2019), and lack of satisfaction with supervision (Cornér et al., 2017). From the researchers' experience with Algerian doctoral students, it was mostly and informally reported that publishing their articles, which should be closely related to their theses as a graduation requirement, and writing their dissertations are the hardest parts of their doctoral experience. In addition, it is observed in Algerian contexts that the higher education sector is not adequately linked to the job-market in terms of quantity and quality, and the rate of unemployed Ph.D. holders in Algeria is growing at an alarming rate. Consequently, the overwhelming majority of them consider primarily adhering to research and/or teaching positions at the university. Hence, it is clear that further research is needed in the Algerian higher education context to tackle these variables and their relationship to experienced burnout.

CONCLUSION

Feelings of burnout are a widely common trait among doctoral students in graduate school all over the world. This research contributes to the body of research by identifying a significant prediction for academic burnout among doctoral students in Algeria using the Expectancy-Value model. Although there has been a wide selection of literature that deals with burnout and motivation, this research incorporates the most influential model in motivation theory with feelings of academic burnout. This study also expands and reinforces (and often contradicts) previous literature through the addition of explanatory variables (faculty attachment and years of enrolment) to offer a clearer view into the central tendencies of Algerian doctoral students. A plethora of undetermined reasons might interfere with this conclusion as the effect of success expectancy and task values on burnout explained only a medium estimation of effect size. Students' faculty attachment determined that the field of study to which they belong significantly affects their experience of burnout. On a universal consensus, there are obvious differences between doing research in Sc.D. for STEM graduate students and Ph.D. programmes, for innovation opportunities differ to a considerable extent in both domains. In addition, the results have shown that, with more years spent on doing their respective courses, feelings of academic inefficacy, cynicism, and emotional exhaustion would surface and ultimately result in undesirable consequences such as delays in graduation. This study suggests that doctoral students should have clear expectations of their courses to predict whether or not they are able to finish the course in due time. They should also think about the extent to which they value their courses, have a clear idea of how well they can achieve in their course, assess their motivation towards completing the course, know the benefits of completing their course, and get acquainted with the time and effort needed to finish their course. Supervisors are also recommended to equip their doctoral supervisees with realistic expectations towards the course right from the beginning, and regularly remind them of the values of their programmes should they experience academic burnout.

This study has a number of limitations. First, although the sampling technique was judged as the most suitable for the sample of this research to reach out to the maximum number of participants in the selected higher education institutions, it does not offer equal opportunities for every doctoral student to participate in this research. This has several detrimental implications to the study; using a probability sampling technique could have resulted in more categorical data of students from differ-

ent departments and specialities, which would ultimately strengthen the associations between the variables of the study and the analyses of variance results to offer a clearer, more sophisticated description of the sample differences. Hence, with a refined sample, more variables could be studied such as more categories of students with more years of enrolment for doctoral candidates, along with other different criteria such as dissertation advancement rate and achieved graduation criteria (namely conference presentations and article-publishing). Furthermore, although the expectancy-value model used in this study was validated and used in previous studies, the researchers call for the development of a better standardised and validated unit of measurement for expectancy-value to include more items to refine the construct validity of the instrument. Finally, the researchers call for an in-depth qualitative study in order to understand the concerns of doctoral students, and ultimately explain another proportion of variance in their experience of academic burnout.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AVAILABILITY OF DATA

The data of the study is not available due to ethical considerations.

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APPENDIX

This questionnaire aims to investigate the effect of doctoral students' course expectancy and values on their experience of burnout. We kindly invite you to respond to this brief questionnaire. Please be aware that your participation is entirely anonymous, and your data will remain completely confidential; access to data is bound only to the researchers. Please note that, by accepting to respond to this questionnaire, you are giving the researchers consent to use your feedback in their research. Your participation is valuable and will be for the betterment of Algerian doctoral students.

BACKGROUND INFORMATION

Faculty of Origin:

- Nature and Life Sciences
- Science and Technology
- Economy
- Law and Political Sciences
- Humanities and Social Sciences
- Languages and Literature
- Maths and Computer Sciences
- Sports and Physical Education

Number of years of enrolment in the doctoral course so far:

Strongly Disagree (1) Disagree (2) Neutral (3) Agree (4) Strongly Agree (5)

EXPECTANCY-VALUE

Success Expectancy

1. I do not have difficulties understanding my research topic.
2. I am good at my research.
3. I expect to finish my research and graduate on time.
4. My research skills are good enough to publish papers and complete my thesis.

Task Value

1. I am really keen to learn a lot during my doctoral training
2. My doctoral course is important to me personally.
3. It is important to me personally to be good at my research.
4. I enjoy solving problems in my doctoral research.
5. I would like to spend more time on my research.
6. I do not notice time passing when I am working on my doctoral research.
7. I always look forward to learning more about my research.
8. If I can learn something new about my research, I am willing to use my free time to do so.
9. I need good research skills later in my life.
10. My doctoral course is of great value to me later in my life.
11. I would have to sacrifice a lot of time to achieve well in my doctoral training. *
12. Spending years on my doctoral course is not worth it compared to the outcome of the course. *

BURNOUT

Exhaustion

1. I feel emotionally drained by my studies.
2. I feel used up at the end of a day at university.
3. I feel tired when I get up in the morning and I have to face another day of my doctoral course.
4. Studying or attending a postgraduate course is really a strain for me.
5. I feel burned out from my studies.

Cynicism

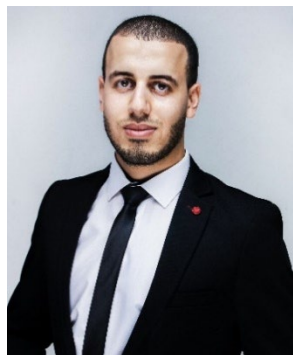
1. I have become less interested in my doctoral studies since my enrolment at the university.
2. I have become less enthusiastic about my doctoral studies.
3. I have become more cynical about the potential usefulness of my studies.
4. I doubt the significance of my doctoral studies.

Academic efficacy*

1. I can effectively solve the problems that arise in my doctoral studies.
2. I believe that I make an effective contribution to the classes that I attend.
3. In my opinion, I am a good postgraduate student.
4. I feel stimulated when I achieve my study goals.
5. I have learned many interesting things during the course of my doctoral studies.
6. During class I feel confident that I am effective in getting things done.

***Reverse Scored Items**

AUTHORS



Dr. Rida Sellali completed his graduate studies at the University of Mustapha Stambouli Mascara in Applied Linguistics. He is currently in charge of teaching academic writing, research methodology, and educational psychology to undergraduate English-language students at the University Centre of Si-Lhaouas – Barika, Algeria. His research interests are Educational Psychology, Language Assessment and Testing, Second-Language Acquisition (SLA), and English as a Medium of Instruction (EMI).



Nour El Houda Lahiouel is an Algerian Ph.D. Candidate at the School of Modern Languages and Applied Linguistics in the Faculty of Arts, Humanities, and Social Sciences at the University of Limerick, Ireland. Her research interests are Learning Disabilities, Dyslexia, English as a Medium of Instruction (EMI), and Inclusive Pedagogy.