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The evaluation of individual and relational factors in university drop-out through a statistical analysis model of mediation [1]

La valutazione di fattori individuali e relazionali nella dispersione universitaria attraverso un modello di analisi statistica della mediazione

di
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Abstract

The present study aims to examine the relationships between affective dimensions (psychological distress and levels of experienced anxiety and anger), relational dimensions (interaction with the university context) and the risk of drop-out in a sample of 128 university students (88.8% women, average age 21), recruited through the Ongoing University Guidance Service of the Department of Education at Roma Tre University, and during the university laboratory exercises. Students filled a battery of online questionnaires, which included: a) a drop-out intention scale; b) the STAI-Y assessing anxiety levels; c) the STAXI evaluating

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anger levels; d) the OQ-45.2 assessing psychological distress; e) a short scale assessing the quality of engagement with university context. Statistical analyses showed positive correlations between drop-out intention and anxiety, anger levels and psychological distress. Negative correlations between drop-out and poor quality of engagement with university were also revealed. Regression models indicate that high scores of socio-relational problems, inadequate student-teacher relationship and high levels of self- directed anger predict drop-out intention. A mediation analysis reveals the quality of the student-teacher relationship as a mediator between psychological distress and the intention of abandonment, highlighting the central role of the educational and didactic relationship.

Keywords: drop-out; ongoing university guidance; psychological distress; teacher-student relationship; university students.

Riassunto

Il presente studio si propone di esaminare le relazioni tra dimensioni affettive (*distress* psicologico e livelli di ansia e rabbia esperiti), dimensioni relazionali (interazione con il contesto universitario) e rischio di *drop-out* in un campione di 128 studenti universitari (88,8% donne, età media 21 anni) reclutati attraverso il Servizio di Orientamento Universitario *in itinere* del Dipartimento di Scienze della Formazione dell'Ateneo Roma Tre e durante le esercitazioni didattiche universitarie. Gli studenti hanno compilato una batteria di questionari *online*, che comprendeva: a) una scala di intenzione di *drop-out*; b) lo STAI-Y per valutare i livelli di ansia; c) lo STAXI per valutare i livelli di rabbia; d) l'OQ-45.2 per valutare il *distress* psicologico; e) una breve scala per rilevare l'interazione con il contesto universitario.

Le analisi statistiche hanno mostrato correlazioni positive tra intenzione di abbandono e livelli di ansia, rabbia e disagio psicologico. Sono state inoltre rilevate correlazioni negative tra abbandono scolastico e scarsa qualità dell'interazione con il contesto. I modelli di regressione indicano che punteggi elevati di problemi socio-relazionali, inadeguato rapporto studente-insegnante e alti livelli di rabbia autodiretta predicono l'intenzione di abbandono. Un'analisi della mediazione rivela la qualità della relazione studente-insegnante quale mediatore tra disagio psicologico e intenzione di abbandono, evidenziando il ruolo centrale della relazione educativa e didattica.

Parole chiave: *distress* psicologico; *drop-out*; orientamento universitario in itinere; relazione studente-insegnante; studenti universitari.

1. Introduction on the role of individual and relational factors in university drop-out: Recent empirical studies.

As is known, the current increasing rates of university drop-out indicate a strong need for intervention: among OECD countries, about one third of students leaves university (OECD, 2019, 2021) and also in the Italian PNRR (Piano Nazionale di Ripresa e Resilienza; https://www.governo.it/sites/governo.it/files/PNRR_0.pdf) the Mission 4 centered on

Education and Research provided an alarming report regarding the high school dropout rate which “reaches 3.8% in lower secondary schools, where it is strongly correlated with income inequality and a higher rate of poverty and material deprivation, and considerably increases in subsequent education cycles”.

A critical issue of the university system in our country is the high rate of early school leaving, as already highlighted in the Italian report on early school leaving called *Indagine conoscitiva sulla Dispersione scolastica* (Camera dei Deputati, 2014), and as confirmed by several recent data (Domenici, 2016, 2017, 2020; Burgalassi, Biasi, Capobianco & Moretti, 2016).

The abandonment of university studies, furthermore, appears to be a "precocious" phenomenon, which can be observed overall in the passage between the first and second year of the course.

As indicate by Fong, Davis, Kim, Kim, Marriott and Kim (2017) most of the scientific literature that examines the factors influencing academic success or abandonment focuses on variables such as *socioeconomic status* and *previously attended school*.

Although it is essential to identify the social-economic factors, it is also important to investigate *the predictive role of individual factors such as students' cognitive, motivational and behavioral variables*: these are dimensions that affect access, success and permanence in the university.

In this regard, Pritchard and Wilson (2003) already highlighted the role of both social and emotional factors in influencing droup-out risk. Recently, Biasi, De Vincenzo, Fagioli, Mosca and Patrizi (2019) report that an *interaction* between *personal* and *contextual variables* influences drop-out intention. Interventions offered by Ongoing University Guidance and Counselling Services appears effective in preventing this risk (see also Biasi, De Vincenzo & Patrizi, 2021).

In this regard, it is useful to underline how improvement and strengthening of guidance processes are envisaged in the context of the PNRR starting from the last year of high school, and this will certainly be an important challenge for the near future.

Addressing these issues from several points of view, many authors have investigated in particular the role of *self-regulated learning* in influencing academic performances and in preventing the phenomenon of university drop-out (Pellerey, 1996; De Marco & Albanese, 2009; Diseth & Kobbeltvedt, 2010; Heikkila, Niemivirta, Nieminen, & Lonka, 2011; Richardson, Abraham & Bond, 2012, Margottini, 2017).

Furthermore, specific motivational factors are investigated to this purpose, as *intrinsic motivation* or *achievement motivation* (Hall, Perry, Ruthig, Hladkyj & Chipperfield, 2006). Cognitive strategies and motivation to learning can be considered also in mutual interaction to better explain learning processes and to prevent the abandonment of studies (Biasi, De Vincenzo & Patrizi, 2018).

According to the self-regulated learning model of Pintrich (2004) much debated today, it would be precisely the cognitive and metacognitive strategies that individuals adopt that allow them to achieve the learning objectives: these strategies would thus lead to learning outcomes in terms of knowledge, understanding and skill (Vermunt, 1998).

Starting from these considerations, recent surveys conducted by Biasi, De Vincenzo and Patrizi (2017) have highlighted, through regression models, the impact of some predictive factors of the risk of drop-out of university students among which are included: a condition of a-motivation to the specific study undertaken, an inadequate cognitive processing method and a low perceived self-efficacy.

On the other hand, as recent international literature shows, some indicators of psychological distress represented by high levels of anxiety and depression have a negative impact on the degree of well-being of the student, generating negative consequences on academic performance. In this regard, numerous studies indicate the importance of promoting the individual well-being of the student by directing him towards the development of specific cognitive and metacognitive strategies that are effective in facilitating learning (Stallman, 2010; Buchanan, 2012; Ibrahim, Kelly, Adams, & Glazebrook, 2013; Bukhari & Saba 2017).

Moreover, as Lam, Wong, Yang and Liu, refer in 2012, the *student engagement* appears a central topic related to educational outcomes: it is conceptualized as a metaconstruct with affective, behavioral and cognitive dimensions. Data show that students are engaged in school when they feel that their teachers adopt motivating instructional practices and offer social-emotional support.

In this regard, Holen, Waaktaar and Sagatun (2018) have indicated that *teacher-student relationship* can be considered a potential mechanism to reduce the negative association between mental health problems and school drop-out. Applying a students' self-report scale they showed that the effect of mental health on drop-out was mediated by the teacher-student relationship.

Very recently, also McQuillin and Lyons (2021) have investigated the importance of program-level variables in match retention. They have collected data from a national survey of youth mentoring programs (N = 1451) and - using a Bayesian Additive Regression Trees (BART) model - discovered a set of four training-related variables and 26 other covariates (e.g., program size, budget, demographic composition), but the real statistically significant predictor of premature match closure was identified in the low frequency of ongoing training and, expecially, in the absence of support contacts per month. These results also underline the role of the quality of student engagement with the educational context.

In relation to the effectiveness of different types of guidance for students of different age groups, Lazonder and Harmsen conducted an accurate meta-analysis in 2016 comparing the results obtained from 72 studies on the. The data compared generally showed facilitating effects of the various forms of guidance on *learning activities*, i.e. on the specific activities that students carry out during the learning process; on the achievement or not in the different performances (*performance success*); and on the learning levels achieved (*learners outcomes*).

In detail, the type of guidance implemented - that means the nature of support offered to the student - moderated the effects on *performance success*. Furthermore, a considerable variation was found in the effects of guidance on the activities carried out during the learning process, while the relatively low number of studies did not allow conclusions to be drawn on any differences related to the age groups of the students involved.

Considering the panorama of recent empirical results described above and having the objective of analyzing the role and weight covered by some individual psychological factors (as emotional and wellness dimensions) and interpersonal factors (i.e., particularly the quality of teacher-student relationship), here we intend to present some evidences showing their influence on academic success and permanence in the university.

2. Aim, Methods, Participants, Procedure, Instruments or Measures, Results

2.1 Aim of the study

The present cross-sectional study aimed to examine the association between individual variables, perceived quality of the interaction with the academic context and drop-out intention in a sample of university students. We examined the predictive factors of drop-out intention and explored possible mediation paths between these variables and drop-out risk.

2.2 Participants

A total of 128 students (88,8% female, mean age 21 year) participated in the study. The participants were recruited through the Ongoing University Guidance service and during the university laboratory exercises on a voluntary basis; each of them signed an informed consent prior to participating to the survey.

2.3 Procedure

All participants were briefly introduced to the study procedures by two research assistants who asked them for some socio-demographic information and on the course of study attended; then, totally 128 participants independently filled out a battery of questionnaires through the Limesurvey online platform. Some participants (n = 79) completed the entire procedure on site, while others (n = 49) answered the questionnaires remotely due to the covid-19 health emergency. The whole individual session procedure lasted about 1 hour.

2.4 Instruments or Measures

In addition to gathering some information about socio-demographic variables and university studies, a battery of questionnaires was used which included:

- The *Drop-out intention scale*: The scale to measure drop-out intentions was based on items derived from Hardre and Reeve's scale (2003). The original tool is aimed at high school students, but has been suitably adapted for college students. The drop-out intention scale consists of four items investigating the frequency with which students "think they have made a mistake in choosing their degree course", "think of quitting their degree course", "think of changing their degree course", "think of dropping out of university to do something else". The answer is given on a 5-point Likert scale ranging from 1 (never) to 5 (Always or nearly always). A Principal Components Analysis (PCA) was performed on a sample of 68 students, showing the presence of a unique factor explaining 88.36% of the variance (Biasi, 2019; Fagioli, 2019).

- The *State Trait Anxiety Inventory (STAI-Y;* Spielberger, 1983; Spielberger & Vagg, 1984 *)* is a frequently used tool to assess state and trait anxiety. It consists of two subscales, with 20 items each: state anxiety, evaluating how the subject feels when completing the questionnaire, and trait anxiety, which evaluates how he usually feels, regardless of the specific context. The STAI scale items are scored on four levels of anxiety intensity from 1 "not at all" to 4 "very much", with higher scores indicative of higher level of anxiety.

- *The State-Trait Anger Expression Inventory (STAXI;* Spielberger, 1988; 1999; Spielberger, Reheiser & Sydeman, 1995) is a self-report used to assess experience, expression and control of anger. It includes 44 items for which individuals classify their feelings of anger on a four-point scale that evaluates the mode of expression, repression and control. STAXI evaluates how angry a person feels at a given moment (State-Anger), how often the person feels angry over time (Trait-Anger), and what the person does when feels angry. In particular, the expression of anger is divided into three components: Anger Expression-Out concerns the expression of angry feelings towards other people or objects; Anger Expression- In refers to anger turned inward and Anger-Control evaluates the individual differences in controlling the expression of anger. A further scale has been developed from the Anger Expression-Out, Anger Expression- In and Anger-Control scales to have a general index of the frequency with which anger is expressed, regardless of how it is directed. The Italian validation was performed by Comunian (1992).
  We will consider in particular the Anger Expression-In score given the relationship between anger suppression and feelings of depression, which likely might be associated with drop-out intention.

- The *Outcome Questionnaire 45.2* (OQ-45.2; Lambert & Hill, 1994; Lambert et al., 1996; Lambert et al., 2004) is a self-report questionnaire consisting of 45 items evaluating any changes obtained following a therapeutic intervention. It includes 3 subscales that mainly evaluate three aspects of the subject's functioning: a) *Symptomatic Distress* (SD), made up of 25 items evaluating the presence of common psychological symptoms, such as anxiety and depression; b) *Interpersonal Relations* (IR), made up of 11 items assessing difficulties in different interpersonal relationships, such as isolation or conflict; c) *Social Role* (SR), which includes 9 items investigating any problems of the subject in work, school and university contexts. The response to each item is obtained on a 5-point scale (from 0 "Never" to 4 "Nearly always") and it is possible to calculate a global score indicative of the general functioning of the subject and different scores for the three subscales. The total score ranges from 0 to 180 and higher values are indicative of greater distress. The Italian validation of the scale highlighted the usefulness of the tool in university services (Lo Coco et al., 2008).

- The *Brief Questionnaire on the Perceived Quality of the Interaction with the Academic Setting* (also defined student engagement, that detect the quality of social networking, the utilization of students' facilities and the quality of the interaction with teachers, Fagioli & Biasci, 2018) is a short self-report questionnaire consisting of 3 item assessing students' engagement into university life respect to: 1) *social engagement*, i.e. participating in events sponsored by the university, developing positive social relationships and share informations, help guidance with other students; 2) *overall satisfaction with university facilities* such as library, auditorium, social life and accessibility of ICT facilities; 3) *quality of student-teacher relationships*, i.e., student's perception of a positive and supportive relationship with teachers. For each item, the participants express to what degree they agree or disagree on a 10-point likert scale.

2.5. Statistical analysis and Results

Statistical analyses were conducted using IBM SPSS 27 statistical package.

Correlational analyses (Pearson coefficients) were performed to explore the relationship between the following dimensions:

1) *total drop-out intention* (detected by a scale derived from that of Hardre and Reeve of 2003);
2) *psychological status* (detected by three different questionnaire: STAI, STAXI and OQ-45.2);
3) *student engagement* (detected by the *Brief Questionnaire on the Perceived Quality of the Interaction with the Academic Setting* that takes into account the quality of social network, the utilization of student facilities and the teacher-student relationship).

Subsequently, correlations with significant p-value were entered in a linear multiple regression model to better analyse the association between the three aforementioned dimensions: psychological conditions, perceived quality of the interaction with the academic context and drop-out intention. To further consolidate the results obtained, an analogous multiple regression analysis was conducted using the stepwise method.

Finally, a mediation analysis was conducted using a regression-based approach with the SPSS macro PROCESS 3.5 (Hayes, 2017) in order to explore possible mediation paths between these variables and drop-out intention.

Correlation coefficients between drop-out intention scale, state and trait anxiety, state and trait anger and anger expression, three subscales of OQ-45.2 and the three factors of perceived quality of the interaction with the academic context are reported in Table **1.**

Regarding psychological dimensions, significant and positive correlations were observed between drop-out intention and state anxiety ($r= 0.229$; $p<0.01$), trait anxiety ($r= 0.418$; $p<0.01$), anger expression- in ($r= 0.387$; $p<0.01$), and with all the dimensions of the OQ-45 questionnaire; in particular, with Symptom Distress ($r= 0.416$; $p<0.01$), Interpersonal Relations ($r= 0.331$; $p<0.01$), Social Role ($r= 0.529$; $p<0.01$) and with the total score of the QO-45 ($r= 0.459$; $p<0.01$). On the other hand, significant and negative correlations were observed between drop-out intention and all the dimensions of perceived quality of the

interaction with the academic context, in particular with social engagement (r= -0.260; p<0.01), overall satisfaction with university facilities (r= -0.228; p<0.05) and quality of student-teacher relationships (r= -0.327; p<0.01).
In summary, higher drop-out intention scores were associated with higher scores of trait and state anxiety, anger expression-in, with higher scores on all the scales of general psychological functioning (expressed by OQ-45 scores) and with lower scores of perceived quality of the interaction with the academic context.

Table 1 - Bivariate correlations between Drop-Out intentions and psychological and contextual factors in a sample of 128 university students.

Questionnaires	Drop-out intention scale
STAI - State Trait Anxiety Inventory	
STAI S	**0.229****
STAI T	**0.418****
STAXI - State Trait Anger Expression Inventory	
S-Rab	0.120
T-Rab	0.056
T-Rab/T	0.009
T-Rab/R	0.038
AX/In	**0.387****
AX/Out	0.049
AX/Con	-0.100
AX/EX	0.072
Outcome Questionnaire 45.2	
Symptom Distress	**0.416****
Interpersonal Relations	**0.331****
Social Role	**0.529****
OQ-45.2 Total Score	**0.459****
Perceived quality of the interaction with the academic context	
Social engagement	**-0.260****
Satisfaction with university facilities	**-0.228***
Teacher-Student relationship	**-0.327****

*Legend: STAI S: State anxiety; STAI T: Trait anxiety; S-Rab: State anger; T-Rab: Trait anger; T.Rab/T: Temper anger; T-Rab/R: Reaction anger; AX/In: Anger Expression- In; AX/Out: Anger Expression-Out; AX/Con: Anger-Control; AX/EX: Anger expression. * p < 0.05; ** p < 0.01. Significant p values are indicated in bold.*

To better explore the results of bivariate analyses concerning the relations between psychological factors, perceived quality of the interaction with the academic context and drop-out intention, two linear multiple regression models were conducted considering drop-out intention score as dependent variable. Independent variables were state and trait anxiety, anger expression-in, the three subscales of OQ-45.2 and the three items measuring the perceived quality of the interaction with the academic context.
Table **2** illustrates the results of the first linear multiple regression model. The results show that the model is significant (R^2 =0.356; Adjusted R^2 = 0.306; F= 7.111; p< 0.001): in particular, the Social Role subscale of the OQ-45.2 (β = 0.439; p<0.001) and teacher-student

relationship (β = -0.240; p<0.01) were significant predictors of drop-out intention. According to conventional criteria proposed by Keith (2015), the effect of the Social Role can be considered large (> 0.25), while the effect of teacher-student relationship seems to be moderate. Thus, in our sample, drop-out intention was positively associated with higher scores in the SR subscale, which are indicative of difficulties in work, school and university contexts, and negatively associated with the perception of a poor quality relationship between student and teacher. This result is in line with a previous study which showed the significant contribution of the quality of social relations in influencing the drop-out phenomenon (Biasi et al., 2019), also highlighting the role of the teacher-student relationship.

Table **2** – Multiple regression analysis predicting drop-out intention.

	Drop-out intention	
Predictors	**Beta**	**P**
STAI S	-0.110	0.305
STAI T	0.083	0.516
AX-IN	0.178	0.053
Symptom Distress	0.035	0.834
Social Role	**0.439**	**<0.001**
Interpersonal Relations	-0.051	0.635
Social engagement	0.014	0.897
Satisfaction with university facilities	0.103	0.336
Teacher-Student relationship	**-0.240**	**<0.01**
Summary statistics		
Model F	**7.111**	
P	< 0.001	
R^2	0.356	
Adjusted R^2	0.306	

Legend. STAI S: State anxiety; STAI T: Trait anxiety; AX/In: Anger Expression- In. Significant p values are indicated in bold.

Similar results were obtained for the regression model using the stepwise method, in which we considered the same variables (Table **3**). The final model (R^2 =0.339; Adjusted R^2 = 0.323; F= 20.811; p< 0.001) including only significant predictors showed the contribution of the Social Role subscale of the OQ-45.2 (β = 0.389; p<0.001), teacher-student relationship (β = -0.193; p<0.05) and anger expression–in (β = 0.192; p<0.05). In this case, the effect of the Social Role can be considered large, while the effect of teacher-student relationship and anger expression-in are moderate (Keith, 2015). As in the previous model, drop-out intention was positively associated with social role problems and negatively associated with teacher-student relationship; furthermore, not including in the final model the other variables (state and trait anxiety, all subscales of OQ-45.2 and the three item of perceived quality of the interaction with the academic context) made significant the positive association between drop-out

intention and anger expression-in: students more prone to turn inward their anger showed higher drop-out intention.

Table **3** – Stepwise regression analysis predicting drop-out intention.

	Drop-out intention	
Predictors	**Beta**	**P**
Social Role	**0.389**	**<0.001**
Teacher-Student relationship	**-0.193**	**<0.05**
AX-IN	**0.192**	**<0.05**
Summary statistics		
Model F	**20.881**	
P	< 0.001	
R^2	0.339	
Adjusted R^2	0.323	

Legend: AX/In: Anger Expression- In. Significant p values are indicated in bold.

Finally, we tested a mediation path between the general index of psychological distress, expressed by the OQ-45.2 total score, teacher-student relationship and drop-out intention.
Figure **1** reports the results of mediation analysis in which we considered teacher-student relationship as mediator between the OQ-45.2 total score and drop-out intention.
Non standardized total effects were significant, and the coefficients are reported in the figure. OQ-45.2 total effect on drop-out intention was significant (b= 0.0662, p<0.01, CI [0.0426-0.0899]), as well as the indirect effect of the total score on drop-out intention through teacher-student relationship (b= 0.0092, Bootstrap CI [0.0013-0.0213]).
It thus appears that the relationship between general functioning and drop-out intention is mediated by the quality of teacher-student relationship: higher OQ-45.2 scores seem to be associated to drop-out intention both directly and through the effect of a lower teacher-student relationship score.

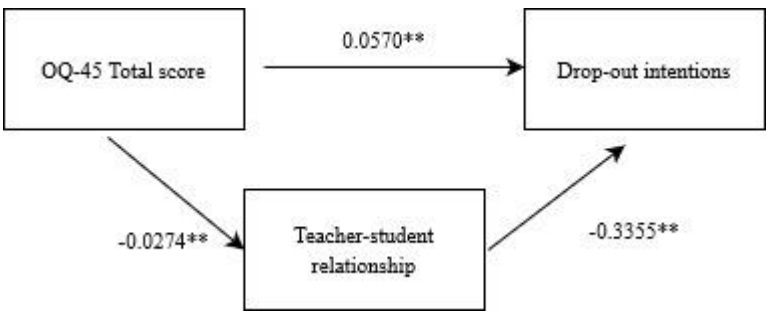

Figure **1.** Mediation analysis results.

Moreover, no significative differences were observed in the investigated variables between 79 participants that completed the entire procedure on site, respect the others 49 participants that answered the questionnaires remotely due to the covid-19 health emergency.

3. Conclusions

In conclusion our results showed an association between drop-out intention and some individual variables and perceived quality of the interaction with the academic context.
In particular, drop-out intention was positively associated with trait and state anxiety, anger expression-in (that represents an index of depression) and with all the dimensions of general psychological functioning measured by the OQ-45.2. On the contrary, it was negatively associated with perceived high quality of the interaction with the academic context.
Furthermore, the presence of social role problems, inadequate teacher-student relationship and anger expression-in play a central role as risk factors for the development of drop-out intention.
In summary, the general psychological distress appeared directly associated to drop-out intention and indirectly associated, that means mediated, through the effect of the quality of teacher-student relationship.
Considering these findings, it became important to develop ongoing interventions for preventing this phenomenon. At this regard, it appears necessary to take into account, at the same time, the role of both psychological variables and relational ones: such as the level of interaction with the university context and, *in primis*, the quality of teacher-student relationship.

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