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Analysis of factors potentially associated with nursing students' academic outcomes: A thirteen-year retrospective multi-cohort study



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ABSTRACT

Background: Low academic success rates lead to fewer than the required number of nurses entering the national health systems, impacting on the supply of nurses and with negative consequences for global health care since low nurse-to-patient ratios are associated with an increase of patients' adverse outcomes.
Objectives: This study was mainly aimed at documenting any of the academic outcomes' potential predictors among Nursing Degree Program (NDP) students' characteristics.
Design: A retrospective multi-cohort study was conducted.
Participants and Setting: Ten cohorts of nursing students enrolled in a central Italy university were involved.
Methods: Qualitative and quantitative data on entry characteristics and academic outcomes were retrieved, observing retrospectively 10 cohorts of Italian nursing students for 13 academic years (2004–2017).

Multiple regression analyses were conducted to assess if potential predictors reporting a p-value < 0.05 in univariate analyses were independently related to academic outcomes.

Results: A total of 2278 students were enrolled in this study. Multivariate analyses showed that 'female gender', 'having attended classical or scientific upper-secondary school', and 'having higher upper-secondary diploma grade' were associated both with the qualitative outcomes (graduation within the legal duration of NDP) and the quantitative ones (final degree exam grade). The weight of the 'admission-test score' in explaining the variance of academic performances was very low ($\beta = 0.03$, 95% CI = 0.01 to 0.05) compared to the 'upper-secondary diploma grade' ($\beta = 0.14$, 95% CI = 0.12 to 0.16).

Conclusions: This evidence should lead to a reflection on the entry-selection methods for NDP, especially in those countries such as Italy, where these methods are essentially based on the entry-test, which in this study was shown to have a very low predictive power for academic outcomes.

1. Introduction

Research concerning nursing students' academic outcomes such as success or failure has been continuing for over half a century (Merkley, 2015; Urwin et al., 2010), and it has long been known that outcome rates could depend on the assumed definitions and the features of nursing education programs in each country (Salamonson and Andrew, 2006). Nevertheless, it is widely accepted that the ideal academic progression of nursing students should lead to attaining graduation within the legal duration of the degree program, which in the literature is defined as academic success (Dante et al., 2013a; Dante et al., 2015; Lancia et al., 2013). However, due to the dynamic, complex, and multidimensional nature of the interactions between students'

characteristics and Higher Education Institutions (HEIs), not all students experience academic success (Jeffreys, 2015; Urwin et al., 2010), resulting in a rate of academic failure varying from 9.0% to 46.3% across the world (Bulfone et al., 2011; Seago et al., 2012). In fact, many students voluntarily or involuntarily drop out the Nursing Degree Program (NDP) (Pitt et al., 2012; Ten Hoeve et al., 2017; Wray et al., 2017), while others are retained to either re-sit their failed exams or for personal reasons (e.g. family, work or heath) until they graduate or definitely withdraw (Cameron et al., 2011a, 2011b).

Low academic success rates lead to fewer nurses than required entering the national workforce (Cameron et al., 2011a; Gaynor et al., 2006), with negative impact on the supply of nurses (World Health Organization, 2013) and consequences for global health care (World

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Health Organization, 2006) since low nurse-to-patient ratios are associated with an increase of patients' adverse outcomes (Aiken et al., 2002; Aiken et al., 2014; Needleman et al., 2002; Petrucci et al., 2015). Moreover, when students fail, universities lose financial resources, with a negative impact on their economic efficiency (Pub. L. No. 240, 2010; Raisman, 2013). Therefore, documenting students' academic outcomes and their potential determinants could be the first step for universities to face students' difficulties and consequently facilitate the nursing students' academic success, promoting their own economic sustainability and contributing to satisfy the community's health needs (Jeffreys, 2015). However, even though much evidence showed that students' profile, including gender, age, and pre-entry qualification, could be associated with academic outcomes, such results do not allow the adoption of effective strategies to reduce academic failure since they were often conflicting or focused on non-modifiable students' characteristics (Cameron et al., 2011b; Dante et al., 2013b; Gaynor et al., 2006; Urwin et al., 2010). Nevertheless, the entry-test scores and upper-secondary school grades have often been identified as good criteria to select the best candidates (Lancia et al., 2013; Newton et al., 2007) even though in the nursing field the contrasting evidence highlights the need to deeply understand the role of these predictors (Dante et al., 2013b).

Since the contemporary society needs nurses that fit with the modern health paradigm, the academic education is requested to provide nursing students both with appropriate theoretical knowledge and practical skills (York et al., 2015). Therefore, taking into account these peculiar aspects of nursing education, research should not be limited to evaluating academic success just as a dichotomous outcome (success or failure), which refers to the ability or inability to attain graduation within the legal duration of the NDP. It should also be focused on a quantitative analysis of students' performances, such as the 'mean grade of intermediate exams' and the 'final degree exam grade', that are considered proxy measurements of the achievement of theoretical and practical learning objectives (York et al., 2015).

The only way to provide universities with effective entry-selection methods to offer the best-educated professionals to the community is to deeply detect the relationship between all possible academic outcomes and entry characteristics of nursing students in the current systems as well as their trends over time.

For these reasons, this study aimed to retrospectively investigate any relationship between nursing students' academic outcomes and their potential predictors through a thirteen-year observational study.

2. Methods

2.1. Study Design

A retrospective multi-cohort study was conducted and reported according to STROBE recommendations (von Elm et al., 2008). Ten cohorts of students admitted to the NDP first years from 2004 to 2013 were observed for an overall period of thirteen years. The study ended in May 2017 when the observation period of the last cohort (2013) was concluded.

2.2. Population and Setting

The study was performed into the NDP of a university in central Italy. Since 1992, Italian nursing education takes place at the university level only (Pub. L. No. 502, 1992), and according to the Bologna Declaration (1999) the programs became homogeneous throughout the national territory with the exception of small differences permitted by law (Zabalegui et al., 2006).

In Italy only students with at least 12 years of prior formal education are allowed to be admitted to university courses and admission into the NDP depends on passing an entry-test based on multiple-choice questions about the following topics: 'logic and general education', 'mathematics and physics', 'biology', and 'chemistry' (Pub. L. No. 477, 2017). The NDP lasts 3 years and requires students to obtain 180 credits (5400 h), passing exams in theoretical activities (at least 96 credits), clinical training activities (at least 60 credits), and other activities (approximately 24 credits) (Pub. L. No. 128, 2001). Grades of intermediate exams range from 18 to 31 (i.e. the maximum grade with honours), while the final exam ranges from 66 to 111 (i.e. the maximum grade with honours).

2.3. Data Collection

For all students admitted to the NDP first years from 2004 to 2013, the following data were retrieved from multiple administrative electronic records: 1) personal data, 2) type of upper-secondary school attended, 3) grade of upper-secondary diploma, 4) score in entry-test, 5) mean grade of intermediate exams, 6) grade of final degree exam, and 7) graduation within the legal duration of NDP (yes/no).

Academic outcomes were defined both through a qualitative measurement (success or failure), which refers to the ability to attain graduation within the legal duration of the NDP course, and quantitative ones (academic performances), such as the 'mean grade of intermediate exams' and the 'final degree exam grade'.

Upper-secondary school attended was dichotomized into two main categories: 'classical and science education' and 'technical and professional education'.

2.4. Data Analysis

Data analysis was performed in the second half of 2017, after the conclusion of the observation period of the last cohort enrolled in the 2013/2014 academic year.

In order to avoid information bias, the building of final dataset, obtained through the merging of data from multiple administrative electronic records, was performed independently by two researchers.

Descriptive analyses were used to illustrate the characteristics of the sample. Categorical variables, such as 'gender', 'upper-secondary school attended', and 'graduation within the legal duration of course', were described through frequencies and percentages, and their trends over the period 2004–2017 were tested using the Royston's test (Sribney, n.d.).

Continuous variables, such as 'age', 'upper-secondary diploma grade', 'admission test score', 'mean grade of intermediate exams', and 'final degree exam grade' were expressed as mean and standard deviations, and their trends over time were analyzed using the slopes regression analysis (β) (Remy et al., 2005).

Univariate logistic or linear regression analyses, as appropriate, were performed to document the potential predictors of academic outcomes, which in this study were identified both as quantitative variables ('mean grade of intermediate exams' and 'final degree exam grade') and qualitative ones (graduation within the legal duration of course). The predictive power was expressed as odds ratio (OR) with 95% confidence interval (95% CI), or linear regression coefficient (β). Next, multiple regression analyses were conducted to assess if predictors reporting a p-value < 0.05 in univariate analyses were independently related to academic outcomes, adjusting for all other independent variables.

The Pearson coefficient was calculated to examine the degree of correlation between 'mean grade of intermediate exams' and 'final degree exam grade'.

A p-value < 0.05 was the criterion for statistical significance. The data were processed using the STATA/IC 15.0 statistical package.

3. Results

Among 2402 eligible students, a total of 2278 (94.8%) students were enrolled in this study (Fig. 1). Table 1 shows the participants'



Fig. 1. Flowchart of the recruitment process.

characteristics, highlighting that female gender was predominant (63.1%) and that the mean age at the time of matriculation was 22.0 (SD = 4.9).

Before matriculation, 54.4% of the students had attended a classical or science upper-secondary school, while the remaining (45.6%) had attended other types of upper-secondary schools (e.g. professional, technical or similar). The mean of upper-secondary diploma grades was 73.5/100 (SD = 12.7) and the mean of admission test scores was 40.2/ 80 (SD = 11.8).

During the NDP attendance, the mean grade of intermediate exams obtained by the students was 26.4/31 (SD = 1.4) and the mean grade of final exam was 106.5/111 (SD = 4.6), while students that graduated within the legal duration of NDP were 61.5%.

Fig. 2 shows the trend analysis of the ten cohorts observed along the study duration. As relevant results, a significant decrease in the students' age ($\beta = -0.294$; p < 0.001) and a linear increase in the number of students who have attended classical and science education before matriculation ($\beta = 0.262$; p < 0.001) were observed, while no statistically significant changes were detected in academic outcomes over the years.

In the univariate analyses, 'gender', 'upper-secondary school attended', 'upper-secondary diploma grade', and 'admission-test score' resulted as potential predictors of academic outcomes and were included in the multivariate logistic or linear regression models, as appropriate (Table 2). These models confirmed that 'female gender', 'having attended classical or scientific upper-secondary school', and 'having higher upper-secondary diploma grade' were associated both with the qualitative outcomes (graduation within the legal duration of NDP course) and the quantitative ones (final degree exam grade). Although it was significant in the linear models, but not in the logistic ones, the weight of the 'admission-test score' in explaining the variance of academic performances (final degree exam grade) was very low ($\beta = 0.03$, 95% CI = 0.01 to 0.05) compared to the 'upper-secondary diploma grade' ($\beta = 0.14$, 95% CI = 0.12 to 0.16).

Academic performance measured as the 'mean grade of intermediate exams' was not tested as a dependent variable in the multivariate linear model since its correlation with the 'final degree exam grade' was found to be very high (Pearson correlation coefficient = 0.94, p < 0.001).

Finally, subgroup analysis showed that the weight of 'upper-secondary school attended' and 'upper-secondary diploma grade' through the 10 cohorts investigated remains constant in explaining the variance

Table 1	
Darticipante'	characteristics

-		
Matriculation year, n (%)		
2004	132	(5.8%)
2005	193	(8.5%)
2006	195	(8.6%)
2007	188	(8.3%)
2008	232	(10.2%)
2009	241	(10.6%)
2010	269	(11.8%)
2011	274	(12.0%)
2012	273	(12.0%)
2013	281	(12.3%)
Total	2278	(100.0%)
Gender, n (%)		
Females	1438	(63.1%)
Males	840	(36.9%)
Age (mean (SD), median (IOR))		
Females	22.0 (5.2).	20.0 (4.0)
Males	22.0(4.3), 20.0(4.0)	
Total	22.0 (4.9).	20.0 (4.0)
Type of upper-secondary school, n (%)	2210 (115),	2010 (110)
Classical and science education	1225	(54.4%)
Technical and professional education	1025	(45.6%)
Upper-secondary diploma grade (from 60 to 100) mean	1020	(101070)
(SD)		
Females	75.3	(10.9)
Males	70.5	(9.6)
Classical and science education	74.2	(10.5)
Technical and professional education	72.7	(10.8)
Total	73.5	(12.7)
Admission test score (up to 80) mean (SD)	/ 0.0	(12.7)
Females	39.8	(11.9)
Males	40.8	(11.5)
Classical and science education	40.0	(11.7)
Technical and professional education	39.3	(10.0)
Total	40.2	(11.8)
Intermediate exame' grade (from 18 to 31) mean (SD)	10.2	(11.0)
Females	26.7	(1, 3)
Males	25.9	(1.3)
Classical and science education	26.7	(1.4)
Technical and professional education	26.0	(1.3)
Total	26.0	(1.4)
Graduated within the legal duration of the degree	20.4	(1.4)
program n (%)		
Females	060	(67.4%)
Malas	422	(07.470)
Classical and saisman advantion	433	(31.3%) (6E 104)
Technical and professional education	797 586	(03.1%)
Tetal	1402	(57.270)
Final degree even grade (from 66 to 111) mean (SD)	1402	(01.570)
Final degree exam grade (nom oo to 111), mean (SD)	107.2	(4.2)
Moloc	107.3	(4.2) (F.0)
Classical and ssigned adjustion	104.0 107.6	(3.0)
Classical and professional education	107.0	(3.9)
Total	105.1 106 E	(3.0)
10(a)	100.5	(4.0)

of academic outcomes, while the weight of 'females', though always higher than that of 'males', is inconstant along the observational period.

4. Discussion

In order to broaden knowledge of the potential determinants of academic success in the NDP, 10 cohorts of nursing students were followed retrospectively for 13 years from 2004 to 2017 involving 2278 participants.

As far as we know, no similar studies as sample size and duration of the observation period were found in the international literature.

The descriptive analysis confirmed that the investigated sample had characteristics similar to those of the general Italian population of nursing students (AlmaLaurea, 2017; Ministry of Education, University, and Research, 2017).

The predominance of females, already highlighted in similar studies conducted in other countries, reflects the history and social perception



Fig. 2. Cohorts' trend analysis *Royston p test **Analysis of the slope of the regression line (β).

of the nursing profession as mainly female (D'Addio, 2011).

Looking at the trend analysis (Fig. 2), two things are visible at a glance: the first is the lowering of the mean age of the students enrolled at the NDP over the years; the second is the inversion of the relationship between those who came from professional or technical institutes and those who came from classical or scientific schools, resulting in a current proportion favorable to the last ones.

The reasons for these dynamics are to be found both in the improvement of the nursing image (Dignani et al., 2014; Rubbi et al., 2017) and in the greater employment opportunities for nurses compared to other health professionals, especially in the context of an economic crisis that particularly affected the Italian system in the recent period (AlmaLaurea, 2016; de Belvis et al., 2012; Mastrillo, 2016).

Therefore, nowadays younger and differently qualified students seem to be more inclined to get the enrolment in NDPs than in the past.

The changes that have occurred over time showed an increase of the quantitative outcomes defined in this study as academic performances ('mean grade of intermediate exams' and 'final degree exam grade'), which does not correspond to an increase of the qualitative ones (ability to attain graduation within the legal duration of course). Although data on the qualitative outcome may depend on the assumed definitions of academic success and features of nursing education programs worldwide (Dante et al., 2016), the globally 38.5% failure rate detected in this study is comparable to both data from other Italian universities (AlmaLaurea, 2017; Dante et al., 2013a) and international sources

(Bulfone et al., 2011; Seago et al., 2012).

That means that there is still a wide range of possible actions to take for the improvement of the capacity of universities to increase the number of current graduates. This is expected both because nursing students who annually attain graduation in Italy do not satisfy the turnover of nurses required to ensure the best patients' outcomes (Organisation for Economic Co-operation and Development, 2015), and because the rate of academic success also impacts on annual universities' government funding since success rates are a law-based measure of efficiency of HEIS (Pub. L. No. 240, 2010).

As it is in the interest of both universities and communities to invest in the training of nursing students who are more likely to achieve the best academic outcomes, this study was mainly aimed at documenting any of the potential predictors among their objective characteristics.

Results of this study strengthen, by better clarifying the relationships among the involved variables, the findings that other studies (Cameron et al., 2011a; Dante et al., 2013b; Gaynor et al., 2006; Urwin et al., 2010), although conducted through smaller samples and for shorter times, had in whole or in part already highlighted: that is that students who are females, who have attended classical or scientific upper-secondary school, and who have obtained a higher upper-secondary diploma grade are more likely to achieve academic success in nursing degree programs.

This evidence should lead to a reflection on the entry-selection methods for NDP, especially in such countries as Italy, where these

Table 2

Academic outcomes predictive analyses.

Univariate and multivariate logistic regression analysis for 'Graduation within the legal duration of course'

			Univariate logistic regression			Multivariate logistic regression		
	Success $n = 1402$	Failure $n = 876$	OR	95% CI	p-Value	OR	95% CI	p-Value
Gender								
Male ^a	51.6%	48.4%	1	-	-	1	-	-
Female	67.4%	32.6%	1.94	1.63-2.31	< 0.001	1.62	1.34-1.95	< 0.001
Age	Mean 22.1, SD 5.2	Mean 22.0, SD 4.5	1.00	0.99-1.02	0.681	-	-	-
Upper-secondary school								
Technical and professional education ^a	57.2%	42.8%	1	-	-	1	-	-
Classical studies and science education	65.1%	34.9%	1.40	1.18-1.65	< 0.001	1.21	1.01-1.45	0.040
Upper-secondary school grade	Mean 75.1, SD 10.7	Mean 71.0, SD 10.1	1.04	1.03-1.05	< 0.001	1.03	1.03-1.04	< 0.001
Admission test score	Mean 40.3, SD 12.0	Mean 40.0, SD 11.6	1.00	1.00-1.01	0.476	-	-	-

Univariate and multivariate linear regression analysis for 'Final degree exam grade'

	Univariate linear regression			Multivariate linear regression			
	Linear regression coefficient, β	95% CI	p-Value	Linear regression coefficient, β	95% CI	p-Value	
Gender							
Male ^a	0	-	-	-	-	-	
Female	2.44	2.00 - 2.88	< 0.001	1.35	0.92 - 1.77	< 0.001	
Age	0.04	-0.01 - 0.08	0.091	-	-	-	
Upper-secondary school							
Technical and professional education ^a	0	-	-	-	-	-	
Classical and science education	2.54	2.12-2.96	< 0.001	2.02	1.63 - 2.42	< 0.001	
Upper-secondary school grade	0.16	0.14-0.18	< 0.001	0.14	0.12-0.16	< 0.001	
Admission test score	0.04	0.02-0.06	< 0.001	0.03	0.01 - 0.05	< 0.001	

^a Reference category.

methods are essentially based on the entry-test, which in this study was shown to have a very low predictive power for academic success.

Since HEIs cannot consider the 'gender' and the 'type of uppersecondary school attended' as selection criteria according to ethical issues and national law (Pub. L. No. 107, 2015), 'upper-secondary school grade' could not be ignored in a nursing student's entry-selection model based on scientific criteria, as it should be (Andrew et al., 2008; McCarey et al., 2007; Rodgers et al., 2013). It means that because 'empathy' and 'attitude towards nursing' are important characteristics for a student who wants to undertake a 'helping profession' as nursing is (Petrucci et al., 2016; Rubbi et al., 2017), non-cognitive skills should also be taken into consideration for NDP admission criteria.

4.1. Strengths and Limitations

This study was conducted through one of the largest samples of nursing students available in the literature and minimizing the possibility of the selection bias given that > 95% of the eligible participants were enrolled. Furthermore, the 13-year trend analysis of quantitative and qualitative academic outcomes and their potential predictors for the first time provided a dynamic view of the phenomenon, as opposed to the static picture that has been documented so far (Cameron et al., 2011a; Dante et al., 2013b; Gaynor et al., 2006; Urwin et al., 2010).

Further research is needed to understand better the role of organizational variables not considered in this study in determining the nursing students' academic success. Moreover, it could be interesting to understand how the academic success can impact on the career progression of newly-graduated nurses.

Finally, even if the data on students enrolled in this study are well suited to the national ones, the generalisability of the results should be taken with caution because it was based on a monocentric approach.

5. Conclusions

This study highlighted that the best nursing students' academic outcomes are associated with 1) the female gender, 2) the frequency of classical or scientific upper-secondary school, and 3) a higher uppersecondary diploma grade. The slight weight of the entry-test based on multiple-choice questions in explaining academic performances should suggest to Countries that use it as main selective method to revise their strategies in order to select nursing students who are more likely to achieve the best academic outcomes.

Contributors

LL, CMG, and PC conceived and designed the study. LL and CV performed dataset merging, and in collaboration with DA and LCC checked its final version to avoid biases. MA performed the statistical analyses and contributed to the critical interpretation of the results in collaboration with the other authors. DA, CV, and LCC drafted the manuscript under the supervision of LL, CMG, and PC. All authors approved the final version and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval

Not applicable.

Declaration of Interest

None.

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References

- Aiken, L.H., Clarke, S.P., Sloane, D.M., Sochalski, J., Silber, J.H., 2002. Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. JAMA 288 (16), 1987–1993.
- Aiken, L.H., Sloane, D.M., Bruyneel, L., Van den Heede, K., Griffiths, P., Busse, R., Diomidous, M., Kinnunen, J., Kózka, M., Lesaffre, E., 2014. Nurse staffing and education and hospital mortality in nine European countries: a retrospective observational study. Lancet 383 (9931), 1824–1830. https://doi.org/10.1016/S0140-6736(13)62631-8.
- AlmaLaurea, 2016. XVIII Indagine (2016) Condizione occupazionale dei Laureati. Available from. http://www.almalaurea.it/universita/occupazione/occupazione14, Accessed date: 27 April 2018.
- AlmaLaurea, 2017. XIX Indagine (2017) Profilo dei laureati 2016. Available from. http://www.almalaurea.it/universita/profilo/profilo2016, Accessed date: 27 April 2018.
- Andrew, S., Salamonson, Y., Weaver, R., Smith, A., O'Reilly, R., Taylor, C., 2008. Hate the course or hate to go: semester differences in first year nursing attrition. Nurse Educ. Today 28 (7), 865–872. https://doi.org/10.1016/j.nedt.2007.12.007.
- Bulfone, G., Predan, S., Zanini, A., Farneti, F., Quattrin, R., Brusaferro, S., 2011. Predictors of nursing student success in an Italian school of Nursing. Ig. Sanita Pubbl. 67 (2), 137–147.
- Cameron, J., Roxburgh, M., Taylor, J., Lauder, W., 2011a. An integrative literature review of student retention in programmes of nursing and midwifery education: why do students stay? J. Clin. Nurs. 20 (9–10), 1372–1382. https://doi.org/10.1111/j.1365-2702.2010.03336.x.
- Cameron, J., Roxburgh, M., Taylor, J., Lauder, W., 2011b. Why students leave in the UK: an integrative review of the international research literature. J. Clin. Nurs. 20 (7–8), 1086–1096. https://doi.org/10.1111/j.1365-2702.2010.03328.x.
- D'Addio, L., 2011. La sanità italiana è donna. In: L'infermiere. 2.
- Dante, A., Fabris, S., Palese, A., 2013a. Time-to-event analysis of individual variables associated with nursing students' academic failure: a longitudinal study. Adv. Health Sci. Educ. Theory Pract. 18 (5), 1047–1065. https://doi.org/10.1007/s10459-013-9448-6.
- Dante, A., Petrucci, C., Lancia, L., 2013b. European nursing students' academic success or failure: a post-bologna declaration systematic review. Nurse Educ. Today 33 (1), 46–52. https://doi.org/10.1016/j.nedt.2012.10.001.
- Dante, A., Fabris, S., Palese, A., RIASI group, 2015. Predictive power of individual factors and clinical learning experience on academic success: findings from a longitudinal study. Nurse Educ. 40 (3), E1–E6. https://doi.org/10.1097/NNE. 00000000000132.
- Dante, A., Ferrão, S., Jarosova, D., Lancia, L., Nascimento, C., Notara, V., Pokorna, A., Rybarova, L., Skela-Savič, B., Palese, A., 2016. Nursing student profiles and occurrence of early academic failure: findings from an explorative European study. Nurse Educ. Today 38, 74–81. https://doi.org/10.1016/j.nedt.2015.12.013.
- de Belvis, A.G., Ferre, F., Specchia, M.L., Valerio, L., Fattore, G., Ricciardi, W., 2012. The financial crisis in Italy: implications for the healthcare sector. Health Policy 106 (1), 10–16. https://doi.org/10.1016/j.healthpol.2012.04.003.
- Dignani, L., Montanari, P., Dante, A., Guarinoni, M.G., Petrucci, C., Lancia, L., 2014. The nursing image in Italy: an analysis of the historic archive of national newspaper. Prof. Inferm. 67 (1), 49–54. https://doi.org/10.7429/pi.2014.671049.
- Gaynor, L., Gallasch, T., Yorkston, E., Stewart, S., Turner, C., 2006. Where do all the undergraduate and new graduate nurses go and why? A search for empirical research evidence. Aust. J. Adv. Nurs. 24 (2), 26–32.
- Jeffreys, M.R., 2015. Jeffreys's nursing universal retention and success model: overview and action ideas for optimizing outcomes A–Z. Nurse Educ. Today 35 (3), 425–431. https://doi.org/10.1016/j.nedt.2014.11.004.
- Lancia, L., Petrucci, C., Giorgi, F., Dante, A., Cifone, M.G., 2013. Academic success or failure in nursing students: results of a retrospective observational study. Nurse Educ. Today 33 (12), 1501–1505. https://doi.org/10.1016/j.nedt.2013.05.001.
- Mastrillo, A., 2016. Corsi di Laurea delle Professioni Sanitarie. Dati sull'accesso ai corsi e programmazione posti nell' A.A. 2016–17. Available from. http://www.fioto.it/ altreimg/Mastrillo%20Report%202016%20d.pdf, Accessed date: 27 April 2018.
- McCarey, M., Barr, T., Rattray, J., 2007. Predictors of academic performance in a cohort of pre-registration nursing students. Nurse Educ. Today 27 (4), 357–364. https://doi. org/10.1016/j.nedt.2006.05.017.
- Merkley, B.R., 2015. Student nurse attrition: a half century of research. J. Nurs. Educ. Pract. 6 (3), 71.
- Ministry of Education, University, and Research, 2017. Focus "Gli immatricolati nell'a.a.

2016/2017 il passaggio dalla scuola all'università dei diplomati nel 2016". Available from. http://www.miur.gov.it/web/guest/pubblicazioni/, Accessed date: 27 April 2018.

- Needleman, J., Buerhaus, P., Mattke, S., Stewart, M., Zelevinsky, K., 2002. Nurse-staffing levels and the quality of care in hospitals. N. Engl. J. Med. 346 (22), 1715–1722. https://doi.org/10.1056/NEJMsa012247.
- Newton, S.E., Smith, L.H., Moore, G., 2007. Baccalaureate nursing program admission policies: promoting success or facilitating failure? J. Nurs. Educ. 46 (10), 439–444.
- Organisation for Economic Co-operation and Development, 2015. Health at a glance 2015. OECD indicators. Available from. https://www.oecd-ilibrary.org/social-issuesmigration-health/health-at-a-glance-2015_health_glance-2015-en, Accessed date: 27 April 2018.
- Petrucci, C., Calandro, M.T., Tresulti, F., Baldacchini, A., Lancia, L., 2015. Relationship between nurse staffing and nursing outcomes: a narrative review of literature. Prof. Inferm. 68 (4), 195–202. https://doi.org/10.7429/pi.2015.684195.
- Petrucci, C., La Cerra, C., Aloisio, F., Montanari, P., Lancia, L., 2016. Empathy in health professional students: a comparative cross-sectional study. Nurse Educ. Today 41, 1–5. https://doi.org/10.1016/j.nedt.2016.03.022.
- Pitt, V., Powis, D., Levett-Jones, T., Hunter, S., 2012. Factors influencing nursing students' academic and clinical performance and attrition: an integrative literature review. Nurse Educ. Today 32 (8), 903–913. https://doi.org/10.1016/j.nedt.2012.04.011.
- Pub. L. No. 107, 2015. Riforma del sistema nazionale di istruzione e formazione e delega per il riordino delle disposizioni legislative vigenti.
- Pub. L. No. 128, 2001. Determinazione delle classi delle lauree universitarie delle professioni sanitarie.
- Pub. L. No. 240, 2010. Norme in materia di organizzazione delle università, di personale accademico e reclutamento, nonche' delega al Governo per incentivare la qualità e l'efficienza del sistema universitario.
- Pub. L. No. 477, 2017. Modalità e contenuti delle prove di ammissione ai corsi di laurea e di laurea magistrale a ciclo unico ad accesso programmato nazionale a.a. 2017/2018.
 Pub. L. No. 502, 1992. Riordino della disciplina in materia sanitaria.
- Raisman, N., 2013. The cost of college attrition at four-year colleges & universities. In: Policy Perspectives. Educational policy institute.
- Remy, Linda, Clay, Ted, Oliva, Geraldine, 2005. Do We Have a Linear Trend? A Beginner's Approach to Analysis of Trends in Community Health Indicators. University of California, San Francisco, Family Health Outcomes Project, San Francisco, CA Available from: https://fhop.ucsf.edu/sites/fhop.ucsf.edu/files/wysiwyg/trend13b. pdf, Accessed date: 27 April 2018.
- Rodgers, S., Stenhouse, R., McCreaddie, M., Small, P., 2013. Recruitment, selection and retention of nursing and midwifery students in Scottish Universities. Nurse Educ. Today 33 (11), 1301–1310. https://doi.org/10.1016/j.nedt.2013.02.024.
- Rubbi, I., Cremonini, V., Artioli, G., Lenzini, A., Talenti, I., Caponnetto, V., La Cerra, C., Petrucci, C., Lancia, L., 2017. The public perception of nurses. An Italian cross-sectional study. Acta Biomed 88 (5-s), 31–38. https://doi.org/10.23750/abm.v88i5-S. 6884.
- Salamonson, Y., Andrew, S., 2006. Academic performance in nursing students: influence of part-time employment, age and ethnicity. J. Adv. Nurs. 55 (3), 342–349. discussion 350-341. https://doi.org/10.1111/j.1365-2648.2006.03863_1.x.
- Seago, J.A., Keane, D., Chen, E., Spetz, J., Grumbach, K., 2012. Predictors of students' success in community college nursing programs. J. Nurs. Educ. 51 (9), 489–495. https://doi.org/10.3928/01484834-20120730-03.
- Sribney, W. A comparison of different tests for trend, StataCorp. Available from. https:// www.stata.com/support/faqs/statistics/test-for-trend/, Accessed date: 27 April 2018.
- Ten Hoeve, Y., Castelein, S., Jansen, G., Roodbol, P., 2017. Dreams and disappointments regarding nursing: student nurses' reasons for attrition and retention. A qualitative study design. Nurse Educ. Today 54, 28–36. https://doi.org/10.1016/j.nedt.2017.04. 013.
- Urwin, S., Stanley, R., Jones, M., Gallagher, A., Wainwright, P., Perkins, A., 2010. Understanding student nurse attrition: learning from the literature. Nurse Educ. Today 30 (2), 202–207. https://doi.org/10.1016/j.nedt.2009.07.014.
- von Elm, E., Altman, D.G., Egger, M., Pocock, S.J., Gotzsche, P.C., Vandenbroucke, J.P., 2008. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. J. Clin. Epidemiol. 61 (4), 344–349. https://doi.org/10.1016/j.jclinepi.2007.11.008.
- World Health Organization, 2006. The World Health Report 2006: Working Together for Health. World Health Organization, Geneva, Switzerland Available from: http:// www.who.int/whr/2006/en/, Accessed date: 27 April 2018.
- World Health Organization, 2013. Global Health Workforce Shortage To Reach 12.9 Million in Coming Decades. World Health Organization, Geneva, Switzerland Available from. http://www.who.int/mediacentre/news/releases/2013/healthworkforce-shortage/en/, Accessed date: 27 April 2018.
- Wray, J., Aspland, J., Barrett, D., Gardiner, E., 2017. Factors affecting the programme completion of pre-registration nursing students through a three year course: a retrospective cohort study. Nurse Educ. Pract. 24, 14–20. https://doi.org/10.1016/j. nepr.2017.03.002.
- York, Travis T., Gibson, Charles, Rankin, Susan, 2015. Defining and measuring academic success. Pract. Assess. Res. Eval. 20 (5), 1–20.
- Zabalegui, A., Macia, L., Márquez, J., Ricomá, R., Nuin, C., Mariscal, I., Pedraz, A., Germán, C., Moncho, J., 2006. Changes in nursing education in the European Union. J. Nurs. Scholarsh. 38 (2), 114–118.