

Burnout in Portuguese Medical Students: Coping Strategies as a Mediating Variable

Henrique Pereira*, Mariana Fernandes, Vitor Costa, Lucia Amorim, Francesco La-Rizza and Rui Hermenegildo

Department of Psychology and Education, University of Beira Interior, Portugal & Psychology & Health Research Unit, ISPA-IU, Portugal

*Corresponding author Henrique Pereira, Department of Psychology and Education, University of Beira Interior, Portugal & Psychology & Health Research Unit, ISPA-IU, Portugal, Tel: 275 329 16 E-mail: mailto:hperreira@ubi.pt

Received date: Jun 29, 2014, Accepted date: Sep 03, 2014, Published date: Sep 8, 2014

Copyright: © 2014 Pereira H, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Background: Recently there have been several studies on the relation between coping strategies and the Burnout outcomes, in medical students. However, there is a lack of Portuguese studies in this area. The objectives of our study were to describe the levels of burnout in a sample of Portuguese medical students, and understand their relation with different study methods and coping strategies

Methods: A cross-sectional study was carried-out among a convenience sample of 658 medical students. The data collection was done using a socio-demographic questionnaire, the Maslach Burnout Inventory - Students Survey, and the Ways of Coping Questionnaire.

Results: Regarding burnout, gender differences were found in the dimensions of 'emotional exhaustion' ($t=-3.07$, $p<0.00$) and 'professional efficacy' ($t=2.08$, $p<0.04$). The burnout syndrome was prevalent in students that have 'difficulty in achieving goals', or with a 'significant problem'. High levels of burnout were associated to escape-avoidance coping, and were more common in the female sample. Low levels of burnout were related to 'plan resolution strategies', 'positive reappraisal' and 'seeking for social support'.

Conclusions: Higher levels of burnout were reported by students with inadequate coping strategies. These results highlight the importance of developing programs to promote psychological well-being through the use of adequate coping strategies and resilient responses to academic and psychological stressors.

Keywords: Burnout; Coping strategies; medical students

Introduction

Medical students' wellbeing is affected by a wide number of variables. Dunn, Iglewicz and Moutier [1] proposed conceptual model of wellbeing in medical students. The authors consider there is a 'coping reservoir', which is affected by negative inputs (stress, internal conflicts, and time and energy demands), as well as by positive ones (psychosocial support, social activities, health and intellectual stimulation). This coping reservoir, includes personality traits, temperament, coping styles, and depends on these inputs, i.e. positive inputs strengthen the coping reservoir and negative inputs weaken it. The different combinations of these variables result in either resilience or burnout.

The burnout syndrome in medical students, has a negative impact at a personal level (increased risk of suicide, depression and anxiety, interpersonal difficulties), at a professional level (compromised patient care, increased medical errors, lower satisfaction with career, poor performance and poor quality of life), and at an academic level (it is correlated with thoughts of quitting the course); hence the importance of studying this syndrome and associated coping strategies [1-10].

Coping

Coping is described in the literature as the «cognitive and behavioral efforts to meet specific requirements, internal and/or external, which are assessed as exceeding/or being within the limits of the individual's resources»[11]. The use of coping strategies is considered crucial for the individual's adaptation outcomes that result from the threat, damage, or challenge assessments, which influence the emotional response to a given situation [11].

Coping strategies have two main functions: one is focused on the problem (requires work in order to change the stressor and solve the problem), and the other is focused on the emotion (regulates the emotional distress) [12,13]. Hypothetically, individuals use both functions when faced with stressful situations [11]. However, studies have shown that younger people use more active and problem-focused coping strategies, while older individuals use more passive and emotion-focused coping strategies; which is in part justified by the fact that stress situations differ according to the age group [11].

Furthermore, the coping process may have functional or dysfunctional results depending on: (a) who uses the coping strategy, (b) when it is used, (c) what are the environmental and intrapsychic conditions of the individual, and (d) which are the adaptive results [11].

In the past decades, several studies have aimed at assessing if students used avoidance coping strategies, such as alcohol and drugs

intake [14-16]. The study developed by Moffat, McConnachie, Ross and Morrison showed that students tended to use more active coping strategies (e.g. acceptance, active coping, planning and self-distraction) than avoidance strategies (e.g., denial, alcohol/drugs). This study also presented gender differences, men used more active coping strategies, resorting more frequently to alcohol and drugs, than women [17]. Other studies have addressed how coping styles are influenced by personality traits [18].

Concerning specifically the academic environment, a relation between coping strategies and exams was found [19], thus, coping strategies related with exams seem to vary according to the individual's perceived academic skills and perceptions of control.

Burnout

According to the literature, burnout is a psychological syndrome that occurs in a context of prolonged response to interpersonal chronic stress, related to work.

This chronic response can result in: 'emotional exhaustion' (break down and loss of emotional resources), 'depersonalization' (affective and emotional distancing in relationships with others; equivalent to 'disbelief' in other studies), and 'reduced personal accomplishment' (self-evaluation component that involves feelings of incompetence and displeasure towards one's professional activity) [20,21].

Regarding gender studies developed in the general population present contradictory results. Some find that gender differences are not very pronounced, however they show that women present a greater emotional exhaustion than men, and that men have higher levels of depersonalization than women (Table 1) [20,22,23]. However, other authors found that levels of depersonalization are more pronounced in women [24]. And, finally, other studies present no gender differences [9].

		Emotional exhaustion	Disbelief	Professional efficacy
N	Valid	658	658	658
	Missing	0	0	0
Mean		12,3313	5,2629	21,9240
Standard Deviation		5,32616	4,54464	5,47197
Number of items		5	4	6
Percentile*		50	60	30

* Considering the sample of Maroco and Tecedeiro's (2009) stud

Table 1: Mean levels of burnout (n = 658)

Problem Based Learning (PBL)

The Problem Based Learning (PBL) can be defined as an alternative teaching method. It is a student-centered learning method in which a problem is the starting point of the learning process [25,26].

PBL presents many significant differences when compared to the traditional teaching methods. In PBL, there are no lessons, theoretical lectures and exercises, rather than this, the teacher presents a problem that the student has to identify and solve, applying previously acquires and new contents. Thus, the learning process shifts from a passive

process (mono-directional exposure) to an active one (problem solving) [27,28].

In a recent study on stress and coping strategies in medical students with a traditional learning curriculum [17], the authors found that the main stressors were more related with medical training (e.g. uncertainty about the individual study behavior, progress and aptitude, specific concerns about evaluation, availability of learning materials), than with personal problems, and the levels of concern tended to increase at the end of the school year. On the other hand, with the new learning curriculum, the group learning environment, the tutor's performance and interactions with peers and patients caused little stress [17]. However, these results are controversial, as in another research problems with tutors were identified as stressors [15].

The lack of information about the relation between burnout and coping strategies, in Portuguese medical students, led to this study. Thus, our aim was to explore and describe the role of coping strategies, as mediators of burnout responses to the environmental stressors.

The main objectives involved: (a) the assessment of burnout levels and coping strategies among medical students; (b) comparing the levels of burnout between genders, and (c) assessing the influence of the teaching method on the burnout levels. To this end we established the following hypothesis:

H1a: Women present higher levels of emotional exhaustion than men.

H1b: Men have higher levels of disbelief than women.

H1c: Men present higher levels of efficacy than women.

H2: Students who believe they have a significant problem, have higher levels of emotional exhaustion and disbelief, and lower levels of professional effectiveness.

H3a: Students who study between 1 and 3 hours present lower levels of exhaustion, than students who study between 4 and 6 hours.

H3B: Students studying between 4 and 6 hours have higher levels of professional efficacy than students studying from 1 to 3 hours.

H4: Students from pre-clinical years (1st, 2nd and 3rd years), present higher levels of exhaustion and disbelief, and lower efficacy, than clinical years' students (4th, 5th and 6th years).

H5: Students who perceive difficulties in achieving objectives, present higher levels of emotional exhaustion and disbelief, than the students who perceive ease in achieving objectives.

H6: Students with a PBL (Problem Based Learning) teaching method have higher levels of professional effectiveness, exhaustion and disbelief, than students with a traditional teaching method (expository).

H7: Men use more escape-avoidance strategies than women.

H8a: Students who use more planned resolution have lower levels of exhaustion and disbelief, and higher levels of effectiveness.

H8b: Students who seek for more social support present less disbelief and exhaustion, and higher levels of effectiveness.

H8c: Students who use more positive reappraisal have lower levels exhaustion and disbelief, and higher levels of effectiveness.

H8d: Students who used more escape-avoidance have lower levels of exhaustion, and higher levels of efficiency and disbelief.

Method

Participants

A cross-sectional study was carried-out among a convenience sample of 658 Portuguese medical students, from the University of Lisbon, the University of Coimbra, University of Porto, ICBAS, University of Minho and the University of Beira Interior participated in this study.

In order to invite the students from these universities to participate in the study, the researchers contacted the public relations offices, academic services, and students' associations, requesting the disclosure of internal mailing lists and forums.

Instruments

In this study we used three instruments. A socio-demographic questionnaire, to assess: age, gender, marital status, socio-economic status, educational institution, academic year, number of elements in the household, awareness of the existence of significant problems, perceptions about the ease or difficulty of achieving the academic goals, satisfaction with the course and what contributes to that level of satisfaction, and perceived social support. Information regarding the teaching method (PBL or traditional) was not requested, as we knew beforehand that the University of Minho and the University of Beira Interior are the only medical schools using PBL.

The Portuguese validation of the Maslach Burnout Inventory - Students Survey (MBI-SS), which is a 15-item survey, with a Likert-type response scale with 7 points (1= 7=), was used to assess the participant's levels of burnout.

The Portuguese adaptation of the Ways of Coping Questionnaire (WOCQ), which is a 48-item questionnaire, with a 4-point Likert-type response scale, that aims at assessing coping strategies used by the respondents. This instrument has eight sub-scales: 'confrontational coping', 'distancing', 'self-control', 'search for social support', 'acceptance of responsibility', 'escape-avoidance', 'planned resolution of the problem', and 'positive reappraisal'.

Procedures

Initially, the instruments were introduced on to an online platform (Google Docs ©), which allowed a nationwide reach.

After the institutional contact with the eight Portuguese Universities that teach medical courses, the students were invited to participate in the study also via e-mail, using the mailing lists and forums provided by the institutions.

We guaranteed the anonymity and confidentiality of the data, and the participants were informed about the aims of the study and agreed, by informed consent, to answer the questionnaires. The informed consent was given by each participant on the online platform before answering the questionnaire.

Results

The students were invited, via e-mail, to participate in this study by completing a self-administered online survey. A total of 658 Portuguese medical students participated in this study. 75% of these students were from the Universities of Lisbon (N=281, 42.7%), Coimbra (N=130, 19.8%) and Beira Interior (N=81, 12.3%), the

remaining 25% were from the Universities of Porto, Minho and ICBAS. Of these, 194 (29.5%) were male and 464 (70.5%) female, with ages between 17 and 36 years (M=21.57, SD=2.85). 150 students (22.8%) attended the 5th year, 134 (20.4%) the 4th year, 104 (15.8%) the 1st year, 98 (14.9%) the 2nd, 92 (14.0%) the 3rd year, and finally 80 students (12.2%) attended the 6th year of the course.

About half the sample (N=324, 49.2%), considered having one significant problem, the most frequently identified problems were 'stress' (9.0%), 'anxiety' (8.2%) and 'family issues' (6.4%). Most students (46.8%) study 2 or 3 hours a day. 440 students (66.9%), attended the University of their choice (first option), and 510 students (77.5%) are moderately or very satisfied with the course.

The MBI-SS subscales revealed an adequate factorial validity in this sample: 'emotional exhaustion' ($\alpha=0.85$), 'disbelief' ($\alpha=0.88$), and 'professional efficacy' ($\alpha=0.80$).

When compared to the results from the validation sample, the levels of 'emotional exhaustion' are similar, the levels of 'disbelief' were slightly higher in our sample and, finally, the 'efficiency' levels were lower.

Regarding H1a, we found that the women in our sample had higher levels of 'emotional exhaustion' ($t=-3.07$, $p<0.00$), contrasting with H1c in which we see that men have greater levels of 'professional efficacy' ($t=2.08$, $p<0.04$). In H1b we can observe that there are gender differences concerning 'disbelief', however they were not statistically significant ($t=0.65$, $p<0.51$).

As for H2, the results show that students who acknowledged, in the socio-demographic questionnaire, the existence of a significant problem, present higher levels of 'exhaustion' ($t=9.30$, $p<0.001$) and 'disbelief' ($t=8.25$, $p<0.001$), and lower levels of 'professional efficacy' ($t=-7.26$, $p<0.001$).

H3, sought to verify whether the study hours influenced the levels obtained in the burnout sub-scales. Thus, for H3a we observed that the participants who studied between 4 and 6 hours had higher levels of 'emotional exhaustion', when compared to those studying between 1 and 3 hours ($t=-4.93$, $p<0.001$), there were also differences concerning 'effectiveness' (H3B), even though they were not statistically significant ($t=-1.19$, $p<0.24$).

H4 was partially supported as students in the preclinical years (1st, 2nd and 3rd years), compared with students from clinical years (4th, 5th and 6th years), present higher levels of 'disbelief' ($t=2.02$, $p<0.04$) and lower levels of 'efficacy' ($t=-1.99$, $p<0.047$). The differences observed concerning the means of the 'emotional exhaustion' sub-scale are minimal, and not statistically significant ($t=0.08$, $p<0.93$).

In H5, we found that students who perceived difficulties in achieving the established goals had higher levels of 'exhaustion' ($t=9.12$, $p<0.001$) and 'disbelief' ($t=10.90$, $p<0.001$), than those perceiving ease in achieving the academic objectives.

H6 aimed at assessing the impact of the teaching method in the three Burnout subscales. The data partially supported our hypothesis, as students with the PBL method presented lower levels of 'disbelief' ($t=-2.18$, $p<0.03$) and higher levels of 'professional efficacy' ($t=3.67$, $p<0.001$). Moreover, regarding 'emotional exhaustion', the differences indicate a greater, but not statistically significant ($t=0.34$, $p<0.73$), level of 'exhaustion' in the students with the PBL method.

Concerning the WOCQ subscales, not all had adequate internal consistency. In particular, the sub-dimensions 'self-control' ($\alpha=0.45$),

'taking responsibility' ($\alpha=0.44$), 'confrontational coping' ($\alpha=0.55$), and 'distance' ($\alpha=0.55$) that presented unacceptable values and were excluded from the investigation. The sub-scales 'search for social support' ($\alpha=0.67$), 'escape-avoidance' ($\alpha=0.65$), 'planned resolution' ($\alpha=0.74$) and 'positive reappraisal' ($\alpha=0.74$) presented adequate values and, thus, were maintained.

H7 was not supported. Furthermore we noted that, in our sample, women reported a greater use of 'escape-avoidance' strategies than men, presenting statistically significant differences ($t=-2.81, p<0.01$).

H8, aimed at assessing the effects of coping strategies as mediators of the burnout levels. Concerning 'planned resolution', we found that students who reported greater use of this strategy present lower levels of 'exhaustion' ($t=3.50, p<0.001$) and 'disbelief' ($t=4.52, p<0.001$); and higher levels of 'efficiency' ($t=-7.02, p<0.001$), thus confirming H8a.

Regarding 'social support', H8b was partially supported, as we found that students who mentioned a greater use of this coping strategy presented lower levels of 'disbelief' ($t=2.96, p<0.003$), and

higher levels of 'professional efficacy' ($t=-3.79, p<0.001$); however the differences in the 'exhaustion' levels are not statistically significant ($t=1.36, p<0.17$), despite showing that students who rely more on this strategy have lower levels of 'emotional exhaustion'.

When it comes to the coping sub-scale 'positive reappraisal', we found that students who use this coping strategy show lower levels of 'exhaustion' ($t=2.75, p<0.01$) and 'disbelief' ($t=4.46, p<0.001$), and higher levels of 'efficacy' ($t=-5.14, p<0.001$), thus going against what we had hypothesized in H8c.

The last hypothesis, H8d, was partially supported by the data, as we verified that the use of an 'escape-avoidance' strategy appears to raise the levels of 'disbelief' ($t=-8.51, p<0.001$) and lower the levels of 'efficiency' ($t=7.56, p<0.001$), as we had theorized in the hypothesis. Nevertheless, with regard to 'exhaustion', we found the opposite, a greater use of an 'escape-avoidance' strategy seems to result in higher levels of 'emotional exhaustion' ($t=-10.53, p<0.001$).

The results are summarized on Table 2.

Dimensions	N	Emotional Exhaustion	P	Disbelief	P	Professional Efficacy	P
Gender	194	11,3505	0,002*	5,4433	0,511	22,6082	0,038*
Male	464	12,7414		5,1875		21,6379	
Female							
Significant problems	324	14,1759	0,000*	6,6759	0,000*	20,4105	0,000*
Yes	334	10,5419		3,8922		23,3922	
No							
Study hours	413	11,6077	0,000*			21,7676	0,235
1-3 hours	198	13,8333				22,3283	
3-6 hours							
University year	294	12,3503	0,934	5,6599	0,044*	21,4524	0,047*
Pre-clinic	364	12,3159		4,9423		22,3049	
Clinic							
Difficulty in reaching objectives	320	14,1656	0,000*	7,0906	0,000*		
Yes	338	10,5947		3,5325			
No							
Teaching method	105	12,4952	0,731	4,3810	0,030*	23,7048	0,000*
PBL	553	12,3002		5,4304		21,5859	
Traditional							
Planned Resolution	384	12,9401	0,000*	5,9297	0,000*	20,7031	0,000*
Uses less	274	11,4781		4,3285		23,6350	
Uses more							
Social Support	395	12,5620	0,173	5,6886	0,003*	21,2709	0,000*
Uses less	263	11,9848		4,6236		22,9049	
Uses more							
Positive Reevaluation	329	12,8997	0,006*	6,0426	0,000*	20,8480	0,000*
Uses less	329	11,7629		4,4833		23,0000	
Uses more							

Escape-avoidance	387	10,6382	0,000*	4,0646	0,000*	23,2196	0,000*
Uses less	271	14,7491		6,9742		20,0738	
Uses more							
* the differences are statistically significant for p<0,05.							

Table 2: Relation between the demographic, teaching and coping variables in the Burnout outcomes

Discussion

The research on burnout levels in students is recent, and came from the attempt of explaining, in pre-professional samples, the burnout levels later observed in some professionals [29].

In this way, the results provided us insight about a new reality, not only about burnout and its connection with socio-demographic variables, but also about the mediator effect that coping strategies have on the burnout outcomes, in medical students.

Regarding the relation between psychosocial characteristics, teaching methods, and burnout, our results indicate that women present higher levels of emotional exhaustion, while men present higher levels of professional efficiency, thus, there are significant gender differences in these two dimensions. Several studies reached the same conclusions when comparing genders [20,22,23,30], which may be due to differences regarding the social roles assumed by men and women.

Based on H2 we can observe that the burnout levels are higher in the group of students who considered having a significant problem (such as stress, anxiety and family problems, among others). Some studies suggest a relation between positive personal events and low burnout levels, however the opposite is not true [31]. A link between a low perceived control and high burnout levels has also been suggested [32].

The data we obtained seems to illustrate the importance of how students cope, adaptively or non-adaptively, with negative inputs and the connection of these coping strategies with burnout outcomes.

Moreover, we found that students who study more hours present higher levels of 'emotional exhaustion', however, the fact that they study more hours does not make students feel more effective, thus we believe that many students have low self-efficacy beliefs, not envisioning a relation between the effort expended in studying and a positive result. Some authors have positively correlated emotional exhaustion with the number of hours spent on general activities related to the university [30]. Another possible explanation, based on Covington's theory, may be that the time spent studying is a protective element of the students' sense of efficacy as, in this way, students can impute a less positive result on external factors [33].

The existence of high levels of burnout in the pre-clinical years, namely differences regarding professional efficiency, may be due to a lack of practice (involving contact with people) in these years and, thus, students do not feel effective in the practical application of their theoretical knowledge.

Furthermore, and taking into consideration the differences between teaching methods used in medical courses, we observed that the students with the PBL teaching method showed a greater exhaustion, although the differences were not significant; nevertheless, these

students feel more effective, possibly due to a greater practical applicability of the learned contents.

Regarding the use of coping strategies and gender differences, the 'escape-avoidance' strategy seems to be mostly used by participants of the female gender, which contrasts with what is found in the literature [17]. This result may be interpreted together with another result, women are more emotionally exhausted. This greater 'exhaustion', which may reflect an inability to cope with environmental stressors, can lead to a greater use of 'escape-avoidance' strategies.

Keeping in mind the type of coping strategy, the last hypothesis aimed at understanding how the use different coping strategies mediates different results of burnout or resilience.

The 'seeking for social' support seems to be associated with the actual social support and with the presence of people the student can trust. Thus, and considering the data resulting from this research, there seems to be a relation between social support and lower levels of burnout, which alerts us to the importance of students' integration in a group (the class), as well as their perception of social support, which enables them to cope better with various environmental stressors. In terms of gender differences in the use of 'seeking for social support', some studies point to a greater use of this strategy in female samples, and draw attention to the gender specificities concerning the use of coping strategies [34].

Thus, given the stressors present in our sample (which derive from the year of the course, socio-demographic and individual variables, perceived support, and environmental threats, among others), we found that a greater use of 'planned resolution' strategies, as well as 'seeking for social support' and 'positive reappraisal', which lead to lower burnout levels. On the other hand, the use of strategies such as 'escape-avoidance', seem to result in higher levels of burnout.

The 'escape-avoidance' strategy promotes a withdrawal from a particular problem, and seems to decrease the 'perceived professional efficiency', increasing the 'emotional exhaustion' and 'depersonalization'. In interpreting these data, we can see the importance of the 'planned resolution' of a problem.

Subsequently, the individual can look back and perceive this as a personal growth moment (positive reappraisal), increasing the coping reservoir and decreasing the burnout response. For the clinical practice, this may be viewed not only in a preventive perspective (i.e., of empowering the individual with strategies to solve problems), but also in a more remedial logic, where the therapist seeks, along with the patient, a positive meaning for a stressful situation.

The main limitations of this study are the characteristics of our sample (convenience sample, via Internet), without ensuring homogeneity of the sample's distribution by Portuguese universities that teach medical courses. The low factorial validity of certain WOCQ sub-scales is also a limitation that did not allow grasping the full complexity of the phenomenon under study.

However, the strengths of this study include the sample size, the fact that it is a pioneer study on the relation between burnout dimensions and coping in the Portuguese context.

The need for future intervention programs, on the promotion of physical and psychological well-being, and resilience responses to stressors, becomes evident. Social skills are also an important intervention focus, as these may influence the perceived social support, which might lead to lower burnout levels.

Future studies should ensure the randomization of participants and use a sequential study design, thus allowing an understanding of the phenomena discussed, from the academic training until the professional practice.

Acknowledgements

We are grateful to all participants for their willingness to be part of this study.

References

- Dunn LB, Iglewicz A, Moutier C (2008) A conceptual model of medical student well-being: promoting resilience and preventing burnout. *Acad Psychiatry* 32: 44-53.
- Dahlin M, Joneborg N, Runeson B (2007) Performance-based self-esteem and burnout in a cross-sectional study of medical students. *Med Teach* 29: 43-48.
- Dyrbye LN, Thomas MR, Huntington JL, Lawson KL, Novotny PJ, et al. (2006) Personal life events and medical student burnout: a multicenter study. *Acad Med* 81: 374-384.
- Dyrbye LN, Thomas MR, Huschka MM, Lawson KL, Novotny PJ, et al. (2006) A multicenter study of burnout, depression, and quality of life in minority and nonminority US medical students. *Mayo Clin Proc* 81: 1435-1442.
- Dyrbye LN, Thomas MR, Massie FS, Power DV, Eacker A, et al. (2008) Burnout and suicidal ideation among U.S. medical students. *Ann Intern Med* 149: 334-341.
- Dyrbye LN, Thomas MR, Shanafelt TD (2005) Medical student distress: causes, consequences, and proposed solutions. *Mayo Clin Proc* 80: 1613-1622.
- Jennings ML (2009) Medical student burnout: interdisciplinary exploration and analysis. *J Med Humanit* 30: 253-269.
- Martini S, Arfken CL, Churchill A, Balon R (2004) Burnout comparison among residents in different medical specialties. *Acad Psychiatry* 28: 240-242.
- Carlotto MS, Nakamura AP, Câmara SG (2006) Síndrome de Burnout em estudantes universitários da área da saúde. *Psico* 37: 57-62.
- Dyrbye LN, Thomas MR, Power DV, Durning S, Moutier C, et al. (2010) Burnout and Serious Thoughts of Dropping Out of Medical School: A Multi-Institutional Study. *Academic Medicine* 85: 94-102.
- Lazarus RS, Folkman S (1987) Transactional theory and research on emotions and coping. *European Journal of Personality* 1: 141-69.
- Boekaerts M (1996) Coping with Stress in childhood and adolescence. In: Zeidner M, Endler NS (eds), *Handbook of coping: Theory, Research, applications*, John Wiley & Sons, New York.
- Lisboa C, Koller SH, Ribas FF, Bitencourt K, Oliveira L, et al. (2002) Estratégias de Coping de crianças vítimas e não vítimas de violência doméstica. *Psicologia: Reflexão e Crítica* 15: 345-362.
- Firth J (1986) Levels and sources of stress in medical students. *Br Med J (Clin Res Ed)* 292: 1177-1180.
- Guthrie E, Black D, Bagalkote H, Shaw C, Campbell M, et al. (1998) Psychological stress and burnout in medical students: a five-year prospective longitudinal study. *J R Soc Med* 91: 237-243.
- Guthrie EA, Black D, Shaw CM, Hamilton J, Creed FH, et al. (1997) Psychological stress in medical students: a comparison of two very different university courses. *Stress Medicine* 13: 179-184.
- Moffat KJ, McConnachie A, Ross S, Morrison JM (2004) First year medical student stress and coping in a problem-based learning medical curriculum. *Med Educ* 38: 482-491.
- Weiling W, Miao D (2009) The relationships among coping styles, personality traits and mental health of chinese medical students. *Social Behavior & Personality: An International Journal* 37: 163-172.
- Doron J, Stephan Y, Boiche J, Le Scanff C (2009) Coping with Examinations: Exploring Relationships between Students' Coping Strategies, Implicit Theories of Ability, and Perceived Control. *British Journal of Educational Psychology* 79: 515-528.
- Maslach C, Schaufeli WB, Leiter MP (2001) Job burnout. *Annu Rev Psychol* 52: 397-422.
- Maroco J, Tecedreiro M (2009) Inventário de Burnout de Maslach para estudantes portugueses. *Psicologia, Saúde & Doenças* 10: 227-235.
- Purvanova RK, Muros JP (2010) Gender Differences in Burnout: A Meta-Analysis. *Journal of Vocational Behavior* 77: 168-185.
- Houkes I, Winants YHWM, Twellaar M (2008) Specific determinants of burnout among male and female general practitioners: A cross-lagged panel analysis. *Journal of Occupational & Organizational Psychology* 81: 249-276.
- Mirvis DM, Graney MJ, Ingram L, Tang J, Kilpatrick AO (2006) Burnout and psychological stress among deans of colleges of medicine: a national study. *J Health Hum Serv Adm* 29: 4-25.
- Landriscina F (2005) Il modello Learner-centered nella progettazione di interventi di e-learning. *Simulware E-Learning News*.
- Rideout E, Carpio B (2001) The problem-based learning model of nursing education. In: Rideout E, editor. *Transforming nursing education through problem-based learning*. Canada: Jones and Barlett Publishers, 21-50.
- Chakravarthi S, Vijayan P (2010) Analysis of the Psychological Impact of Problem Based Learning (PBL) towards Self Directed Learning among Students in Undergraduate Medical Education. *International Journal of Psychological Studies* 2: 38-43.
- Jonassen DH (2000) Toward a Design Theory of Problem Solving. *Educational Technology Research and Development* 48: 63-85.
- Martínez IM, Pinto AM (2005) Burnout en estudiantes universitarios de España y Portugal y su relación con variables académicas. *Aletheia* 21: 21-30.
- Lackritz JR (2004) Exploring Burnout among University Faculty: Incidence, Performance, and Demographic Issues. *Teaching and Teacher Education: An International Journal of Research and Studies* 20: 713-729.
- Dyrbye LN, Thomas MR, Harper W, Massie FS Jr, Power DV, et al. (2009) The learning environment and medical student burnout: a multicentre study. *Med Educ* 43: 274-282.
- Santen SA, Holt DB, Kemp JD, Hemphill RR (2010) Burnout in medical students: examining the prevalence and associated factors. *South Med J* 103: 758-763.
- Covington MV (2000) Goal theory, motivation, and school achievement: an integrative review. *Annu Rev Psychol* 51: 171-200.
- Bergman B, Ahmad F, Stewart DE (2003) Physician health, stress and gender at a university hospital. *J Psychosom Res* 54: 171-178.