Personality, cognitive emotion regulation and insomnia

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Introduction

Insomnia is experienced by approximately 19% of university students[1] and is associated with fatigue, depression, anxiety, stress, lower levels of quality of life[2] and lower academic performance[3].
Specific personality traits are observed in insomniacs[4]. Individuals with high scores of neuroticism, i.e., who consider themselves nervous or anxious, report poorer sleep quality[5] and the ones with high perfectionism also reveal more insomnia severity[6]. Doubts about actions and concerns about mistakes are perfectionism dimensions positively associated with insomnia[7]. Socially prescribed perfectionism, i.e. the perception that others hold very high expectations on oneself, is another perfectionism dimension which can predict difficulties initiating and/or maintaining sleep in the long term[8]. In addition, increased perception of stress may also predispose the individual to experience emotional distress and insomnia[9].

Neuroticism, perfectionism, increased stress reactivity and maladaptive emotional regulation strategies can act as precursors of cognitive hyperarousal which in turn can contribute to sleep difficulties[9]. Insomniacs might also share a genetic and physiological vulnerability to hyperarousal[10] which could be intensified by cognitive activity.

Individuals with perseverative negative thinking style, i.e., think about one´s problems (current, past or future) or negative experiences (past or anticipated) in a repetitive, intrusive and persistent way[11] are also more likely to report sleep difficulties[12]. Repetitive thinking in the evening is associated with longer sleep latency, less sleep efficiency and shorter total sleep time, sleep parameters objectively measured with actigraphy[13] .

Cognitive strategies can help managing, regulating and controlling emotions and feelings in perceived distressed situations[14]. Self-blame, blaming others, rumination or focus on thought and catastrophizing are strategies considered to be less adaptive and associated with depression and anxiety while accepting, refocus on planning, positive refocusing, positive reappraisal and putting into perspective are more adaptive and associated with less depression and anxiety[14]. Difficulties regulating emotions when upset are associated with insomnia severity[15] and rumination, defined as thinking about feelings and thoughts related to a negative event that occurred in the past[14], is associated with poor sleep[16].

A bi-directional effect between sleep and mood is expected. Poor sleep quality is associated with subsequent lower positive affect and higher negative affect during the day[17] whereas perceived stress can predict decreased sleep quality[18].

The role of personality factors, stress reactivity and emotion regulation processes for insomnia onset or maintenance requires further investigation to substantiate its evidence. The aim of the present study was to explore the association between personality traits (neuroticism and perfectionism), stress reactivity and cognitive emotional regulation processes and insomnia in a sample of university students, controlling the effect of negative affect, which is likely to influence this association.

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Methods

Participants and Procedures

The research project was approved by the Ethical Committee of the Faculty of Medicine, University of Coimbra, Portugal. The Portuguese validated versions of a set of self-reported questionnaires were administered to a convenience community sample of 549 students (80.1% females) from the first to the sixth year of different courses (Medicine, Dentistry, Psychology, Social Service and Health Technologies) from University of Coimbra and from other higher educational schools in the cities of Coimbra and Oporto (further details are described in a previous study[12]). Aims of the investigation were explained to faculty professors, who agreed to collaborate. At class sessions, after a brief description of the study and ensuring confidentiality, informed written consent was obtained from students who agreed to participate in the research. Mean age of participants was 20.5 years (± 4.83) and was not significantly different between genders (p= .154). The majority of students was single (96.4%) and Portuguese (88.5%).

Instruments

Eysenck Personality Inventory (EPI19)

A short version of the Eysenck Personality Inventory (EPI)[20] was used to measure neuroticism and extraversion (6 items for each personality dimension). Responses are given on a 4-point Likert scale ranging from almost never (1) to almost always (4). Higher values indicated higher levels of neuroticism and extraversion[20,21]. The Portuguese short version of EPI was used[21] in our study and reasonable internal consistencies were obtained neuroticism, Cronbach Alpha, α=.61; extraversion, α=.66.

Multidimensional Perfectionism Scale (MPS22).

The Multidimensional Perfectionism Scale (MPS[22]) is a 35 item self-reported instrument which evaluates perfectionism levels. Responses are given on a five-point Likert scale ranging from strongly disagree (score 1) to strongly agree (score 5). Higher scores indicate higher levels of perfectionism. The scale includes 6 perfectionism dimensions: personal standards (PS), concern over mistakes (CM), doubts about actions (DA), parental expectations (PE), parental criticism (PC) and organization (O). The Portuguese version of MPS has shown good psychometric properties with internal consistencies of perfectionism dimensions varying between α=.74 to α=.93 and a value of α=.86 for the MPS total[23]. In our study a shorter MPS version was used with 24 items (4 items with the highest loadings within each perfectionism dimension of the Portuguese version of MPS were selected)[23].

Multidimensional Perfectionism Scale (MPS24)

The Multidimensional Perfectionism Scale (MPS) by Hewitt and Flett[24] is a self-reported questionnaire with 45 items which assesses 3 dimensions of perfectionism: self-oriented perfectionism, socially prescribed perfectionism and other-oriented perfectionism. Responses to each item are given on a seven-point Likert scale ranging from strongly disagree (score 1) to strongly agree (score 7). Higher scores are associated with higher levels of perfectionism. The Portuguese version of the original MPS has shown very good psychometric properties[25]. In our study only dimensions related to self-oriented perfectionism and socially prescribed perfectionism were investigated (32 items) as in previous studies these specific perfectionism dimensions were particularly associated with sleep difficulties[8]. In our study an internal consistency of α= .85 was observed for self-oriented perfectionism and α= .79 for socially prescribed perfectionism.

Perceived Stress Scale (PSS26)

The Preceived Stress Scale (PSS[26]), a 10 item self-reported questionnaire, was used to measure perceived stress. Responses are given on a 5 point likert scale ranging from 0 "never" to 4 "very often". An higher score is associated with more severe perceived stress. The PSS Portuguese version[27] includes two factors and has reveal good psychometric properties (total scale, α=.87): 1) Factor 1 "perceived distress" related to the perception of how life events can be stressful (unpredictable, uncontrollable, overloading) and can have an emotional impact (α=.84) and 2); Factor 2 "perceived coping" implies lack of control over stressful life events and doubts about one´s coping abilities with problems (α= .75).

Perseverative Thinking Questionnaire (PTQ11).

The Perseverative Thinking Questionnaire (PTQ) is a 15 item content-independent self-report questionnaire that assesses the core characteristics of perseverative negative thinking[11]. Reponses are given on a 5-point Likert scale ranging from 0 "never" to 4 "almost always". Higher scores indicate more severe perseverative negative thinking[11]. The preliminary version of the Portuguese PTQ-15[28] revealed two factors: 1) repetitive thought (represents the actual thinking process) and 2) cognitive interference and unproductiveness (refers to individuals' perceived dysfunctional effects). Its factorial structure does not overlap with the original, yet it is meaningful. Reliability analyses revealed high internal consistencies for both factors (α=.86 and α=.87, respectively) as well as for the total scale (α=.93)[28].

Cognitive Emotion Regulation Questionnaire (CERQ29)

The Cognitive Emotion Regulation Questionnaire (CERQ) is a 36-item multidimensional questionnaire designed to measure specific cognitive emotion regulation strategies used in response to threatening or stressful life events[29]. Responses are given on a 5-point Likert scale ranging from 1 "almost never" to 5 "almost always" [29]. The Portuguese validated version[30] evaluates 8 conceptually distinct dimensions, overlaps with the original factor structure and reveals good psychometric properties: positive reappraisal/planning, α=.89; positive refocusing, α=.86; rumination, α=.78; blaming others, α=.79; putting into perspective, α=.80; self-blame, α=.76; acceptance, α=.70; catastrophizing, α=.74; total α=.89.

Profile of Mood States (POMS31)

The Profile of Mood States (POMS) is a 65 item scale that assesses feelings and emotions that people commonly experience[31]. Responses are given on a 5 point Likert scale, oscillating from 0 "not at all" to 4 "extremely", and refer to the previous month. Five dimensions of the scale were explores: tension-anxiety; depression-dejection; anger-hostility; vigor-activity and fatigue-inertia. The Portuguese version of POMS[32] has shown good psychometric properties in our study: tension-anxiety, α= .87; depression-dejection, α= .93; anger-hostility, α= .92; vigor-activity, α= .82; fatigue-inertia, α= .85. and negative affect, α= .96. An additional dimension of negative affect (NA) was considered in the present study by adding scores of three subscales: tension-anxiety, depression-dejection and anger-hostility (α= .96).

Insomnia Inventory[33]

An Insomnia Inventory was used to identify cases of insomnia. The first items assessed whether the student experienced difficulties initiating or maintaining sleep or early awakening in the previous month. If the sleep complaint was present it was explored whether it was associated with non-restorative sleep or poor sleep quality.

Additionally, it was assessed if the sleep complaint was associated with daytime impairment and if the sleep difficulty occurred even when adequate opportunity and circumstances for sleep existed.
Sleep groups were formed: Insomnia group included students who experienced a persistent sleep complaint associated with non-restorative sleep or perception of poor or very poor sleep in the previous month, associated with complaints of daytime impairment despite adequate opportunity and circumstances to sleep; Insomnia symptoms group integrated students with a sleep difficulty and non-restorative sleep or poor/very poor sleep quality, without daytime impairment; Good sleepers group involved students without sleep complaints and who experienced restorative sleep or reasonable, good or very good sleep quality.

Statistical Analyses

Descriptive analyses were conducted to investigate the frequency of sleep complaints and the prevalence of insomnia. Additionally, ANOVA tests and Post hoc tests were applied to investigate differences between sleep groups relatively to psychological variables. The Tukey HSD post hoc test was applied when equal variances between groups were assumed and Tamhane`s post hoc test was used when equal variances were not assumed.

Results

Descriptive Data

Insomnia was observed in 15.1% of the total sample, 17.1% in females and 6.7% in males. Considering the type of sleep complaint it was observed that 30.9% of the total sample mentioned early morning waking, 29.8% reported difficulties initiating sleep and 27.9% referred difficulties maintaining sleep. Early morning waking was more often reported by women than men (33.2% *versus* 21.5%) as well as difficulties initiating sleep (31.3% *versus* 23.6%) and difficulties maintaining sleep (30.3% *versus* 17.8%).

Differences between sleep groups relatively to psychological factors (Table 1)

In comparison with the group of good sleepers, insomnia symptoms group and the insomnia group reported higher levels of neuroticism, concerns over mistakes. doubts about actions, parental expectations, parental criticism, higher levels of socially prescribed perfectionism and perceived stress (total score and sub-scales scores), more perseverative thinking (total score), higher values of repetitive thinking and perceived cognitive interference/ unproductiveness, higher levels of rumination, self-blame, catastrophizing and higher values of tension-anxiety, depression-dejection, anger-hostility, fatigue-inertia and lower values of vigour-activity.

Additionally, it was observed that the insomnia group reported lower values of extraversion (M=15.2±2.85), lower scores on positive refocus (M=12.6±4.66) and higher levels of acceptance (M=12.4±3.27) in comparison with the group of good sleepers (M=16.1±2.62, p=.033; M=14.2 ± 3.79, p=.014; M=11.2±3.09, p=.028, respectively).

Significant differences were not observed between sleep groups relatively to particular dimensions of perfectionism, i.e., personal standards, organization, self-oriented perfectionism or specific cognitive emotional regulation processes, i.e., positive reappraisal/ planning, blaming others and putting in perspective. Significant differences were equally not observed between sleep groups relatively to the total score of the Cognitive Emotional Regulation Questionnaire.

Differences between sleep groups in psychological factors controlling for negative affect

To investigate whether the results observed previously were a result of high values of psychological distress, an additional variable, designated by negative affect, was formed by adding the scores of three POMS dimensions: tension-anxiety, depression-dejection and anger-hostility. Individuals with values above percentile 75 (score of 50) in the negative affect variable were not included in the subsequent analyses (Table 2).

In comparison with the group of good sleepers, insomnia symptoms group and the insomnia group reported higher values of perceived stress scale (total score and sub-scores), more perseverative thinking (total score) and repetitive thought, less vigour-activity and more fatigue-inertia. The insomnia group also revealed higher values of neuroticism, socially-prescribed perfectionism and rumination in comparison with the group of good sleepers.

Additionally, insomnia symptoms group reported more concern over mistakes, doubts about actions, parental expectations and parental criticism when compared with the group of good sleepers.

Significant differences between sleep groups were not observed in specific dimensions of perfectionism, i.e., personal standards, organization, self-oriented perfectionism or in most cognitive emotional regulation processes evaluated (except rumination).

Discussion

A consistent finding of our study was that students with insomnia reported higher values of socially prescribed perfectionism in comparison with good sleepers. This result is in line with previous findings[8]. An additional contribution is that socially prescribed perfectionism is still higher in insomniacs even when the effect of negative affect is controlled for. This is a new finding and indicates that socially prescribed perfectionism is a personality dimension that should be worth considering in future longitudinal studies when evaluating risk or predisposition factors for insomnia.

Higher scores on perfectionism dimensions related to concern over mistakes, doubts about actions, parental expectations or criticism were also observed in the insomnia group in comparison with the group of good sleepers. When the effect of negative affect was controlled for these differences were no longer observable. Thus, negative affect possibly acts as a mediator enhancing the effect of specific perfectionism dimensions on insomnia. Brand et al.[6] also observed that perfectionism was associated with insomnia severity. When the effect of stress and emotion regulation processes was considered, the association decreased considerably. Schmidt et al.[7] observed that perfectionism dimensions related to doubts about actions and concerns about mistakes were positively associated with insomnia severity while counterfactual thoughts (regret, shame and guilt) mediated this effect.

Another consistent finding was that higher levels of neuroticism were observed in individuals with insomnia or insomnia symptoms, even when the effect of negative affect was controlled. This result is in agreement with the literature[5] and with the view that insomniacs are individuals with a marked neuroticism trait[4]. In fact, individuals with a specific psychological profile of high levels of neuroticism, rumination, tendency to suppress negative emotions and less capacity to cope are more likely to experience long term chronic insomnia[34].

As expected, the insomnia group perceived their lifes as more stressful, doubting about their abilities to cope with

Table 1: Comparisons between sleep groups relatively to personality traits, cognitive emotion regulation processes and mood

	Good Sleepers Group [1]	Insomnia Symptoms Group [2]	Insomnia Group [3]	ANOVA	Post-hoc Tests [*]
EPI	M (SD)	M (SD)	M (SD)	*p*	
Neuroticism	10.3 (2.10)	11.1 (2.46)	12.6 (2.19)	<.001	1<2,3; 2<3
Extraversion	16.1 (2.62)	15.6 (2.72)	15.2 (2.85)	.033	1>3
MPS (Frost et al., 1990))					
Concern over mistakes	8.3 (2.65)	9.3 (3.03)	9.9 (3.32)	<.001	1<2,3
Personal standards	11.7 (3.09)	12.0 (2.99)	12.1 (3.48)	.388	-
Doubts about actions	9.3 (3.05)	10.4 (3.36)	11.4 (3.32)	<.001	1<2,3; 2<3
Parental expectations	9.3 (3.57)	10.4 (3.41)	10.9 (4.33)	.001	1<2,3
Parental criticism	6.5 (2.69)	7.3 (3.17)	8.4 (4.36)	<.001	1<2,3
Organization	15.1 (3.27)	15.2 (3.11)	15.2 (4.08)	.905	-
MPS (Hewitt and Flett, 1991))					
Self-oriented perfectionism	76.4 (15.48)	77.6 (15.0)	76.8 (16.47)	.730	-
Socially prescribed perfectionism	45.0 (9.83)	48.7 (9.80)	52.7 (11.34)	<.001	1<2,3; 2<3
PSS					
Total	17.1 (5.35)	21.0 (5.98)	24.3 (5.55)	<.001	1<2,3; 2<3
F1: Perceived stress	10.4 (3.69)	13.2 (4.41)	15.3 (3.79)	<.001	1<2,3; 2<3
F2: Perceived coping	6.7 (2.34)	7.7 (2.37)	9.0 (2.48)	<.001	1<2,3; 2<3
PTQ					
Total	23.6 (8.31)	27.1 (9.20)	30.0 (9.27)	<.001	1<2,3; 2<3
F1: Repetitive Thought	13.0 (4.32)	14.8 (4.74)	16.2 (4.85)	<.001	1<2,3
F2: Cognitive Interference	10.7 (4.68)	12.2 (5.23)	13.8 (5.09)	<.001	1<2,3; 2<3
CERQ					
Total	93.9 (16.0)	96.5 (16.77)	98.5 (17.66)	.163	-
F1: Positive reappraisal/planning	23.5 (5.50)	23.0 (5.76)	22.1 (5.37)	.212	-
F2: Positive refocusing	14.2 (3.79)	14.1 (4.18)	12.6 (4.66)	.014	1,2>3
F3: Rumination	13 (3.49)	14.4 (3.87)	16.2 (4.31)	<.001	1<2,3; 2<3
F4: Blaming others	6.7 (2.26)	7.2 (2.93)	7.4 (2.84)	.109	-
F5: Putting into perspective	12.8 (3.53)	12.5 (3.35)	12.4 (3.96)	.529	-
F6: Self-blame	5.6 (1.95)	6.2 (2.45)	6.8 (2.46)	<.001	1<2,3
F7: Acceptance	11.2 (3.09)	11.4 (2.82)	12.4 (3.27)	.028	1<3
F8: Catastrophizing	7.1 (2.28)	8.3 (3.06)	9.3 (3.83)	<.001	1<2,3
POMS					
Tension-Anxiety	10.7 (5.05)	15.9 (7.13)	18.3 (6.35)	<.001	1<2,3; 2<3
Depression-Dejection	8.5 (6.90)	14.3 (11.26)	20.4 (11.80)	<.001	1<2,3; 2<3
Anger-Hostility	7.4 (5.94)	11.7 (8.79)	15.9 (9.64)	<.001	1<2,3; 2<3
Vigour-Activity	17.5 (4.42)	15.7 (5.41)	13.8 (5.45)	<.001	1>2,3; 2>3
Fatigue-Inertia	7.4 (4.38)	10.4 (5.69)	12.7 (5.77)	<.001	1<2,3; 2<3
Negative Affect	26.3 (16.17)	40.7 (24.89)	54.7 (25.33)	<.001	1<2,3; 2<3

[*] Tukey HSD test or Tamhane test, as appropriate; PSS: Perceived Stress Scale, EPI: Eysenck Personality Inventory; MPS: Multidimensional Perfectionism Scale; PTQ: Perseverative Thinking Questionnaire; CERQ: Cognitive Emotion Regulation Questionnaire; POMS: Profile of mood states.

Table 2: Comparisons between sleep groups relatively to personality traits, cognitive emotion regulation processes and mood, controlling for negative affect

	Good Sleepers Group [1]	Insomnia Symptoms Group [2]	Insomnia Group [3]	ANOVA	Post-hoc Tests [*]
EPI	M (SD)	M (SD)	M (SD)	p	
Neuroticism	10.0 (1.98)	10.4 (1.99)	12.3 (1.81)	<.001	1,2<3
Extraversion	16.2 (2.58)	15.8 (2.60)	16.1 (2.51)	.317	-
MPS (Frost et al., 1990))					
Concern over mistakes	8.0 (2.36)	8.9 (2.81)	8.5 (2.38)	.005	1<2
Personal standards	11.7 (3.11)	11.8 (2.71)	12.1 (3.18)	.728	-
Doubts about actions	8.9 (2.83)	9.7 (3.10)	10.2 (2.68)	.017	1<2
Parental expectations	9.1 (3.48)	10.2 (3.37)	10.6 (4.46)	.007	1<2
Parental criticism	6.1 (2.21)	7.0 (2.98)	7.4 (3.60)	.002	1<2
Organization	15.0 (3.30)	14.8 (3.22)	15.7 (3.82)	.285	-
MPS (Hewitt and Flett, 1991))					
Self-oriented perfectionism	77.0 (15.51)	76.3 (14.14)	74.3 (13.70)	.620	-
Socially prescribed perfectionism	44.1 (9.79)	46.7 (9.89)	49.1 (9.61)	.007	1<3
PSS					
Total	16.2 (4.95)	19.1 (5.17)	21.4 (4.33)	<.001	1<2,3; 2<3
F1: Perceived stress	9.7 (3.44)	11.8 (3.91)	13.3 (3.12)	<.001	1<2,3
F2: Perceived coping	6.4 (2.28)	7.3 (2.18)	8.1 (2.26)	<.001	1<2,3
PTQ					
Total	22.7 (7.89)	24.9 (8.42)	28.8 (8.51)	<.001	1<2,3; 2<3
F1: Repetitive Thought	12.5 (4.25)	13.9 (4.57)	16.0 (4.56)	.001	1<2,3; 2<3
F2: Cognitive Interference	10.1 (4.35)	11.0 (4.60)	12.8 (4.59)	.003	1<3
CERQ					
Total	94.3 (16.20)	93.9 (16.95)	99.1 (18.36)	.291	-
F1: Positive reappraisal/planning	24.0 (5.61)	23.2 (5.55)	23.6 (4.98)	.436	-
F2: Positive refocusing	14.5 (3.78)	14.0 (4.43)	14.0 (5.00)	.644	-
F3: Rumination	12.8 (3.52)	13.7 (3.74)	15.1 (4.32)	.004	1<3
F4: Blaming others	6.6 (2.09)	6.76 (2.98)	7.5 (3.00)	.165	-
F5: Putting into perspective	13.2 (3.54)	12.5 (3.51)	13.0 (3.88)	.332	-
F6: Self-blame	5.4 (1.84)	5.8 (2.12)	5.9 (1.41)	.227	-
F7: Acceptance	11.2 (3.19)	11.1 (2.96)	12.3 (3.55)	.192	-
F8: Catastrophizing	7.0 (2.26)	7.5 (2.67)	8.1 (3.57)	.051	-
POMS					
Vigour-Activity	17.9 (4.33)	16.3 (5.45)	15.4 (5.13)	<.001	1>2,3
Fatigue-Inertia	6.7 (3.93)	8.0 (4.46)	9.0 (4.10)	<.001	1<2,3

[*] Tukey HSD test or Tamhane test, as appropriate; PSS: Perceived Stress Scale, EPI: Eysenck Personality Inventory; MPS: Multidimensional Perfectionism Scale; PTQ: Perseverative Thinking Questionnaire; CERQ: Cognitive Emotion Regulation Questionnaire; POMS: Profile of mood states

stress[12] and revealed higher levels of perseverative thinking, particularly repetitive thinking and cognitive interference or unproductiveness[13]. In the literature, repetitive thought in the evening has been associated with longer sleep onset latency and lower sleep efficiency[13]. The novelty of our study is that levels of perceived stress and perseverative thinking were still higher in the insomnia group when the effect of negative affect was controlled.

Considering cognitive emotional regulation strategies, insomniacs reported higher levels of rumination, self-blame, acceptance, catastrophizing and lower levels of positive refocusing than good sleepers. This result is expected as rumination, self-blame and catastrophizing are cognitive emotional regulation processes considered to be less adaptive[35]. The observation that insomniacs revealed higher levels of acceptance is somewhat unexpected[14]. Acceptance of a stressful life event has been negatively related to anxiety symptoms[14]. A possible explanation for this result is that insomniacs engage in a passive form of acceptance which is more a form of resignation whereas an active form of acceptance, involving self-affirmation, would be more adaptive[35]. As predictable insomniacs revealed lower levels of positive refocus in comparison with good sleepers. Although positive reappraisal is the cognitive emotional regulation strategy most frequently associated with less symptoms of depression and more adaptive[35], positive refocus, i.e. thinking about joyful and pleasant issues or about the steps to take to solve a negative event is also a strategy that may help subjects to experience less cognitive arousal and consequently insomnia.

When the effect of negative affect was controlled most of cognitive emotional regulation processes were no longer significantly different between sleep groups, except for rumination. This result suggests that negative affect is a mediator activating higher levels of self-blame, acceptance, catastrophizing and lower levels of positive refocusing, compromising sleep. The fact that rumination is still higher in insomniacs when negative affect is controlled for is expected. Rumination and repetitive thinking

are consistently associated with more sleep difficulties in the literature[12,14] and rumination has been associated with poor sleep quality even when controlling for negative mood[36].

Insomnia prevalence (15.1%) in our study was within the prevalence range of a recent systematic review about this topic within university students (9.4%-38.2%)[1] and was higher in females (17.1%) than in males (6.7%), as expected[38]. Early morning waking was the most frequent insomnia symptom, followed by difficulties initiating sleep and difficulties maintaining sleep. This result in agreement with previous studies[8,12].

Limitations of the research include: (i) cross-sectional design of the study which makes it difficult to explore cause-effect associations; (ii) the sample only included university students and was mainly composed by woman (80.1%), jeopardizing generalization of results to other populations; (iii) subjective reports of sleep were obtained and not objective measures of sleep using polysomnography or actigraphy which could have corroborate and strengthen results; iv) insomnia definition followed general criteria for insomnia diagnosis and was only a proxy of insomnia definition postulated by the American Academy of Sleep Medicine (AASM) in the third version of the International Classification of Sleep Disorders (ICSD-3[38]) or by the American Psychiatric Association (APA) in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5[39]).

Conclusion

Individuals with insomnia revealed personality traits of neuroticism and socially prescribed perfectionism, experienced their lives as more stressful, used perseverative repetitive negative thinking to cope with problems or negative life events and rumination as a cognitive emotional regulation strategy to deal with a negative past event (Figure 1). These results were not a result of negative affect. Therefore, specific psychological factors contribute to cognitive hyperarousal and predispose the individual to experience disturbed sleep and consequently insomnia[9]. In future studies it could be worth investigating whether psychotherapies focusing on coping with the mentioned psychological variables could ameliorate students insomnia and improve their well-being and academic performance.

Conflicts of interests state

Authors have no conflict of interests or financial support to disclosure.

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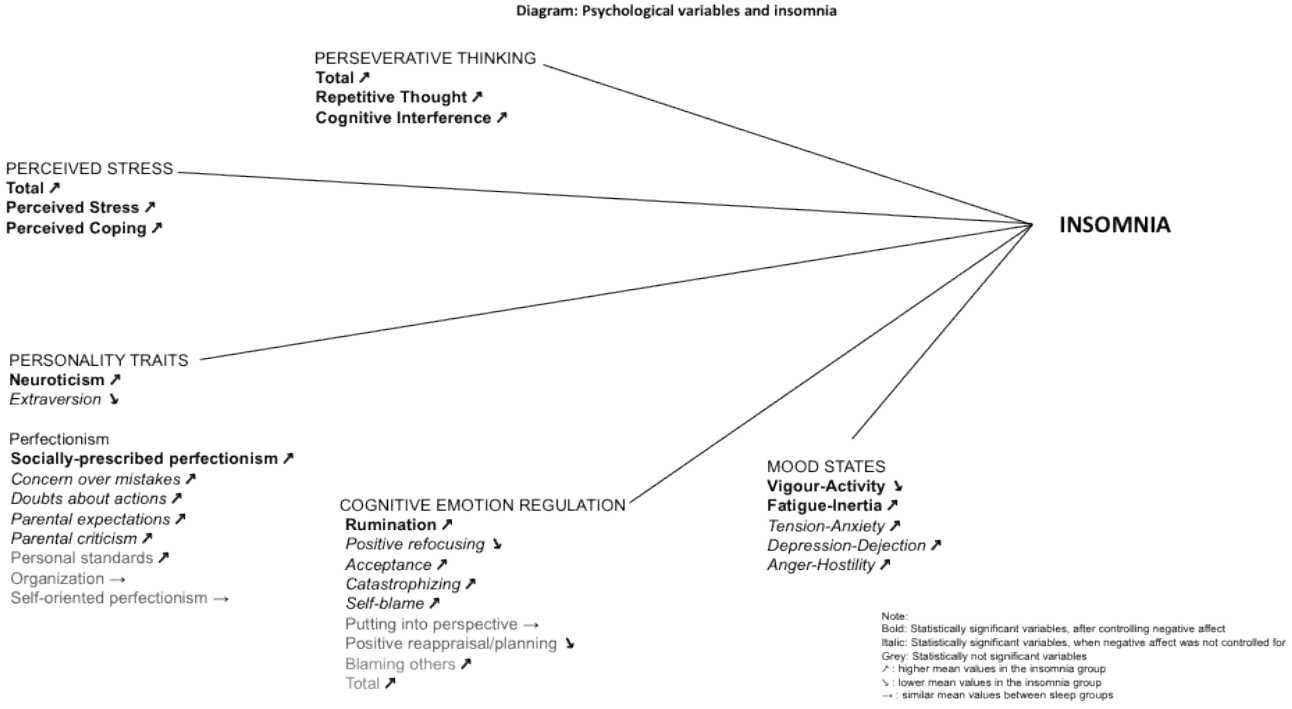

Figure 1: Diagram: Psychological variables and Insomnia

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