

# Gender Differences In The Psychosomatic Reactions of Students Subjected To Examination Stress

**Joanna Kosmala-Anderson, Louise M. Wallace**

---

Health & Lifestyles Interventions Research Centre,  
Coventry University,  
Coventry

---

**United Kingdom**

[j.kosmala-anderson@coventry.ac.uk](mailto:j.kosmala-anderson@coventry.ac.uk)

## Abstract

**Introduction.** The study investigated pre-examination anxiety and emotional control strategies as possible mediators of gender differences in self reported intensity and type of psychosomatic reactions to examination stress.

**Method.** Sample comprised 150 male and 150 female high school senior students and university students who voluntarily participated in the survey. Questionnaires measured the intensity and the type of psychosomatic reactions to examination stress (Psychosomatic Reaction Inventory), pre-examination anxiety level (State-Trait Anxiety Inventory) and the application of emotional self-control strategies (An Emotional Self-Control Strategies Questionnaire).

**Results.** Pre-examination anxiety level was positively correlated with self reported intensity of psychosomatic reactions to examination stress,  $F(2,29)=34.23$ ;  $p<.001$ . Female students experienced higher pre-test anxiety level, stronger psychosomatic reactions to examination stress,  $t(298)=6.24$ ;  $p<.001$ , as well as a greater range of those reactions. High pre-examination anxiety in female students was shown to be a factor meditating their experience of more intense psychosomatic reactions to examination stress,  $F(2, 297)=19.46$ ;  $p<.001$ .

**Conclusions.** There was no moderating influence of application of certain emotional self-control strategies by each gender on self reported intensity of psychosomatic reactions to examination stress.

**Keywords:** gender, pre-examination stress, psychosomatic reaction, emotional self-control strategies

*Receipt of manuscript:* 02-04-2007  
*Inicial acceptance:* 15-05-2007  
*Final acceptance:* 20-08-2007

## Introduction

Examinations are a common short term stressor (Chapell et al, 2005), providing a non invasive paradigm for stress research, while at the same time, this research may have implications for how students can be assisted to prevent and control stress, leading to better performance. It is of theoretical as well as practical benefit to understand why there are reliable gender differences in psychosomatic responses to this stressor.

Psychosomatic reactions occur when physiological reactions characteristic for stress mobilization are strong enough and last long enough to cause general or system limited somatic symptoms that can sometimes lead to a significant adverse emotional reaction (Kosmala, 2004). The direct cause of psychosomatic reactions to stress, and in certain circumstances psychosomatic disorders, is intensification and maintenance of secretory activity of adrenal glands (Bachen, et al, 1992; Brosschot, et al, 1992; Kiecolt-Glaser, Cacioppo, Malarkey and Glaser, 1992; Kiecolt-Glaser, Robles and Glaser, 2002; Reykowski, 1966; Sosnowski, 2002; Terelak, 2002). Secreted adrenaline affecting pre-synaptic receptor  $\beta$ -2 increases the secretion of noradrenaline, which results in maintaining arousal. Due to this mechanism involving pituitary-hypothalamus-adrenal axis activity and hormones (adrenocorticotrophic, corticotropin releasing hormone, adrenaline and noradrenalin) secretion, physiological changes characteristic for acute stress linger. This causes, first quantitative effects, and is sometimes followed by qualitative changes in certain system functions. Those changes manifest as a number of psychosomatic symptoms (Kiecolt-Glaser et al, 2002). The intensity of psychosomatic reactions to stress depends on many situational and individual factors: the characteristics of a stressful situation, its controllability (Terelak, 2002), novelty, its influence on persons' aims and aspirations (Lazarus, 1986), and coping abilities, especially the ability to deal with physiological correlates of stress (Kiecolt-Glaser et al, 2002; Lazarus, 1986; Sosnowski, 2002; Terelak, 2002). Higher intensity of stress (as measured with psychometric tools as well as subjectively evaluated by the person) is associated with higher intensity of psychosomatic reactions to this stress (Kiecolt-Glaser et al, 2002; Kiecolt-Glaser and Glaser, 1991; Reykowski, 1976, Terelak, 2002).

There are well established gender differences in psychosomatic reactions to stress (Caudell and Gallucci, 1995; Day and Livingstone, 2003; Kirshbaum, Wurst and Hellhammer, 1992), including at the level of hormonal reactions to stress. Women are proven to be

physiologically more reactive thus generally their psychosomatic reactions to objectively identical stressor tend to be stronger than men's (Caudell and Gallucci, 1995; Kirshbaum, Wurst and Hellhammer, 1992). The source of those differences seems to be both physiological and psychological (Caudell and Gallucci, 1995). In response to identical stressors women's hormonal systems react faster and stronger than men's (Caudell and Gallucci, 1995; Kirshbaum, Wurst and Hellhammer, 1992). On the psychological level, women and men engage in diverse cognitive and emotional processes when appraising emotogenic situations. Women, when making an evaluation tend to consider an emotional impact of the situation more than men, who are primarily task oriented. Thus the results of this evaluation are often different and therefore they trigger different emotions and accompanying physiological processes (Caudell and Gallucci, 1995).

Taking this under consideration it can be assumed that women, despite the nature of the stressful situation, experience stronger psychosomatic reactions than men. This not only can makes coping with stress a more challenging and difficult task, but also puts women in higher risk of developing psychosomatic disorders. Since the physiological factors that are responsible for gender differences in psychosomatic reactions to stress can not be easily controlled, it is important to recognize psychological factors contributing to women's stronger psychosomatic stress response. Once those factors are identified, it will enable the development of preventive strategies that improve women's stress coping abilities and reduce the risk of developing psychosomatic disorders.

The present study focuses on gender differences in psychosomatic reactions to examination stress. Examination stress is a recurring stressful situation that is faced by a large number of adolescents and young adults. Effective coping with examination stress is very important for a few reasons. First, inability to deal with a stressful situation can lead not only to negative psychological outcomes, but may also cause psychosomatic reactions of various intensity, from almost unnoticeable to very strong symptoms requiring medical assistance. Numerous research studies have shown that recurring physiological arousal in response to stress can, in certain conditions, be the cause of psychosomatic disorders (Adler and Matthews, 1994; Cohen and Herbert, 1996; Glaser and Kiecolt-Glaser 1991; Kiecolt-Glaser et al, 2002). Research that helps to identify effective coping strategies differentiated by gender will help in developing targetted interventions.

The ability to cope with examination stress can not only have long term health implications, but may also influence students' performance. Strong arousal impedes studying for examinations and worsens the performance during the exam (Calvo and Carreiras, 1993; Fincham, Hokoda and Sanders, 1989; Huwe, Henning and Netter, 1998). Assisting students in preventing and controlling the negative outcomes of stress can improve their performance and facilitate obtaining better grades. Thus it can be hoped that this study's results will not only contribute to the development of health promotion programs but will also have implications for educational psychology.

What are the likely factors underlying gender differences in psychosomatic reactions to examinations? Studies have consistently found that female students' test anxiety level is higher than male students' (Hembree, 1988). Those differences can be observed as early as in elementary school, peaks in 5-10 Grade and subsequently decrease in high school and college, though they still remain significant. A recent study conducted by Chapell et al (2005) shows that female students, both graduate and undergraduate, have significantly higher test anxiety level in comparison to men. Study by Woodfield et al confirmed that women, compare to men, express higher level of anxiety and concerns about all aspects of their academic performance (Woodfield, Earl-Novell and Salomon, 2005). If men and women use different patterns of processing and interpreting of emotogenic stimuli (Conway, 2005; Day and Livingstone, 2003), it is possible that women assess exam situations differently: take it more seriously and concentrate more on obtained results and potential consequences of failing or poor performance (Day and Livingstone, 2003; Hong and Karstensson, 2002; Rusillo and Arias, 2004). If that is really the case, it can be expected then in examinations women are more anxious and will consequently have stronger psychosomatic reactions than man.

Studies have also provided evidence that there is a relationship between gender and the frequency of applying certain emotional self-control strategies (Conway, 2005; Larsen, 2000; Lee and Larson, 1986; Lok and Bishop, 1999; Tice and Bratslavsky, 2000). Emotional self-control is defined as relatively stable personality feature that determines the frequency and the intensity of experienced emotions and related thoughts and behaviors that are consistent with standards and norms accepted by a person and/or social expectations (Dolinski, 2000). Authors suggest that some emotional self-control strategies are more effective than the others (Bryant, 1989; Forgas, 2000; Gross, 1998; 2000; Kofta, 1979). The efficacy is defined as its capability to reduce negative feelings, influence psychological distress, cognitive proc-

esses and social relations as well as reduce physiological arousal. There are gender differences in regulating affective states. This may be partly explained by gender related stereotypes which may modify established rules of emotional expression (Averill, 1999; Conway, 2005; Dolinski, 2002). If the expression of a particular emotion deviates from the norm, the person can expect social sanctions (Conway, 2005; Kelly and Hutson-Comeaux, 2000). We assumed that women may use emotional self control strategies to fulfill those expectations and avoid social sanctions. Since emotional self-control strategies are usually used in the situations causing strong emotional arousal, they are probably also applied in the stressful examination situation. It is possible that women use the strategies that are associated with the higher intensity of psychosomatic reactions, while men tend to use those linked with lower intensity emotional expression, in line with social norms.

The study examined the gender differences in pre-examination anxiety levels, application of emotional-self control strategies during and anticipation of examination stress and gender specific psychosomatic reactions to examination stress. The following hypotheses were assumed:

1. The level of pre-examination anxiety and the self reported intensity of psychosomatic reactions to examination stress will be highly correlated.
2. Women will show higher level of pre-examination anxiety than men.
3. Women will report experiencing stronger psychosomatic reactions to examination stress than men.
4. Women will report experiencing more types of psychosomatic reactions to examination stress than men.
5. Women will more often use emotional self-control strategies in relation to examination stress, which are associated with higher intensity of psychosomatic reactions than men.
6. Women's higher pre-examination anxiety level mediates the occurrence of stronger psychosomatic reactions to examination stress among female students.
7. Women's propensity to apply emotional-self control strategies associated with the higher intensity of psychosomatic reactions mediates factor higher intensity of psychosomatic response to examination stress among female students.

## Method

### *Participants*

The final sample comprised of 300 university and secondary school students evenly split by class status and gender, i.e., 150 university students and 150 secondary school seniors; 150 males and 150 females (woman: mean age = 20.18; SD = 2.25; mean years of education = 13.51; SD = 2,11 and men: mean age = 20.96; SD = 2.70; mean years of education = 13.48; SD = 2,31). 347 students have returned completed questionnaires. 18 questionnaires were completed incorrectly, 11 participants reported having health problems (depressive disorders, anxiety disorders, cancer (ongoing chemotherapy), multiple sclerosis, migrens, systemic lupus erythematosus, Rrheumatoid arthritis ) and taking medications that had strong side effects and 18 had personal problems causing severe stress that might have influenced the intensity psychosomatic reactions they have experienced (recent death of family member, illness of family member, ongoing divorce, problems at work). Those data were excluded from further analysis.

### *Developing the tools*

Three questionnaires were developed based on the literature and similar tools designed by other authors (Kosmala, 2004). A pilot study was conducted on a sample of 150 students, and items were chosen for each questionnaire using factor analysis. Internal consistency reliability was established using Cronbach's Alpha.

1. A questionnaire assessed gender, age, past and present somatic and psychological disorders, medication use and lifestyle (nutrition, amount of sleep, sports and stimulants). Previous studies determined that those factors may influence the intensity and type of psychosomatic reactions experienced in stressful situations (Kiecolt-Glaser and Glaser, 1991; Kiecolt-Glaser et al, 2002). The information about somatic disorders and usage of medications were used only to verify if data obtained from each participant should be used for further analysis. Respondents who had long term somatic diseases and took medications known for causing side effects, and psychological disorders that could have been associated with somatic symptoms, or had other factors present in their lives that caused chronic stress were excluded.

## 2. An Emotional Self-Control Strategies Questionnaire.

A classification of emotional self-control strategies was proposed, based on Gross's concept of emotional self-control strategies (Gross, 1998, 2000). Each strategy described in the literature (Bryant, 1989; Forgas, 2000; Gross, 1998; Gross, 2000; Kofta, 1979) was included.

Emotional self-control strategies applied in the earlier stages of emotional processing:

- Reappraisal of emotogenic stimulants (cognitive reinterpretation of emotogenic stimuli that reduces threat appraisal).
- Calming auto-verbalizations
- Active evasion of negative emotion stimulants
- Active coping with problems
- Focusing on something else
- Postponing of activity

Emotional self-control strategies applied in the later stages of emotional processing:

- Suppressing of physiological and behavioral emotional reactions
- Violent relief of negative emotions in order to reduce tension

Emotional self-control strategies that can be applied at any stage of emotional process:

- Using social support
- Suppressing of emotogenic verbalizations

For each strategy three statements that achieved the highest item – total correlation were chosen (between 0.87 and 0.51). The resulting Cronbach's alphas for strategies varied between 0.96 and 0.63 (low factor for one strategy–postponing the activity).

The final version of the questionnaire consisted of 30 statements describing behaviours characteristic for each emotional self-control strategy. The respondents were asked to decide to what extent each statement described their behaviours and actions undertaken in stressful situations. The frequency of occurrence of each behaviour was evaluated on five point scale (never – rarely – sometimes – often – always) and five statements were reverse scored. The indication of applying certain emotional self control strategy was a total score on three state-



ments describing each reaction. The range was 1 – 12 points and the indication of applying the strategy was total score of 7 – 12 points.

### 3. Psychosomatic Reactions Inventory

The principal author proposed a classification of psychosomatic reactions to stress. The first stage of preparing this classification was concerned with analyzing physiological stress reactions, as also described by others: (Bachen et al, 1992; Brosschot et al, 1992; Kiecolt-Glaser et al, 1992; Kiecolt-Glaser et al, 2002; Reykowski, 1966; Sosnowski, 2002; Terelak, 2002). Second, items were designed to cover symptoms arising from systems that are affected by prolonged stress.

- Psychosomatic reaction in the respiratory system (shortness of breath, fainting)
- Psychosomatic reaction in the cardiovascular system (heart action disturbances, palpitation, dizziness, hot flashes)
- Psychosomatic reaction in the digestive system (nausea, diarrhoea or constipation, abdominal pain, vomiting, lost or increasing of appetite)
- Psychosomatic reaction in the urogenital system (dysuria, temporal sexual dysfunctions)
- Psychosomatic reaction in the central nervous system (headaches, sleeplessness or excessive sleepiness, apathy, constant fatigue)
- Psychosomatic reaction in the peripheral nervous system (chills, trembling hands, muscles tension)
- Psychosomatic reaction in the autonomic nervous system (hot or cold flashes, excessive perspiration, sweaty hands, mouth dryness)
- Psychosomatic reaction in the immune system (susceptibility to viral and bacterial infections due to decreased number of T and B lymphocytes, NK cells and decreased secretion of IgA)

Two items concerning the urogenital tract were removed from the inventory due to low responses rates. The resulting Cronbach's alpha for the psychosomatic reactions scale was moderate at 0.69 and the average item – total correlation was 0.29.

The questionnaire included 30 statements. The participants were asked to assess on five point scale how often they experience each symptom in stressful situations (never – rarely – sometimes – often – always). The intensity of psychosomatic reactions was the total score on Psychosomatic Reactions Inventory. The indication of an occurrence of certain type psychosomatic reaction was experiencing at least half of the symptoms describing this reaction often or always.

4. The fourth questionnaire was the State anxiety sub scale of the ISCI-STAI (State Trait Anxiety Inventory) (Spielberg, Gorsuch and Luschene 1983). The instruction was modified so the participants responded in relation to the experienced examination situation.

### *Procedure*

Due to the different examination schedule in secondary schools and universities in Poland the research was conducted in two stages. University students completed the questionnaires during the winter examination session after they had already taken at least one examination. Secondary school seniors completed the survey 4 weeks later, 1-5 days after taking their preparation secondary school examinations. Those examinations are considered very important as the scores obtained influence students' GPAs (Grade Point Average). All the participants were asked to respond in relation to the last exam that they had taken. The procedure was identical in both groups, including a briefing about the purpose, anonymity and consent procedures. 368 numbered envelopes containing two copies of a consent form and four questionnaires were distributed.

### *Timing of measurement*

The level of pre test anxiety, emotional self-control strategies and the intensity and the type of psychosomatic symptoms were sampled one to three days before the first written examination for the secondary school certificate for secondary school seniors, and first written exam in winter exam session for university students.

## Results

*Hypothesis 1: The level of pre-examination anxiety and the self reported intensity of psychosomatic reactions to examination stress will be highly correlated.*

Due to the construction of State Trait Anxiety Inventory (ISCI-STAI) pre-examination anxiety level is an interval variable. To conduct additional statistical analysis this variable was also converted into an ordinal variable. We established three categories: high pre-examination anxiety, average pre-examination anxiety and low pre-examination anxiety. Since the lowest score that can be obtained in ISCI-STAI is 20 points and the highest is 80 points the ranges for each category were the following:

- 20 – 40 points: low pre-examination anxiety
- 41 – 60 points: average pre-examination anxiety
- 61 – 80 points: high pre-examination anxiety.

The mean self reported intensity of psychosomatic reactions among participants was 36.71 (SD=16.47; range 1-100). The mean pre-examination anxiety level for the whole sample was 50.43 (SD=10.67; range 24-73).

Table 1 shows that the mean self reported intensity of psychosomatic reactions to examination stress was the highest among the participants with high pre-examination anxiety (mean=48.19) and the lowest among those who experienced low pre-examination anxiety (mean=26.14).

**Table 1: Self reported intensity of psychosomatic reactions to examination stress among participants with high, average and low pre-examination anxiety level (whole sample).**

<b>Pre-examination anxiety level</b>	<b>N</b>	<b>M</b>	<b>SD</b>
Low	64	26.14	12.58
Average	175	36.58	14.61
High	61	48.19	17.69

Observed differences were statistically significant ( $F(2)=34.23$ ;  $p<.001$ ). Post hoc analysis with Tuckey's RIR test showed that differences between each and every group (high, average and low pre-examination anxiety) were statistically significant ( $p<.001$ ). Pre-examination anxiety level and self reported intensity of psychosomatic reactions to examination stress were strongly correlated (Pearson's  $r=0.49$ ;  $p<.001$ ) so the hypothesis was supported.

*Hypothesis 2: Women will show higher level of pre-examination anxiety than men.*

The mean pre-examination anxiety level among women was 51.52 (SD=10.47; median=54). The mean score obtained by men was 48.68 (SD=10.77; median=48). T Test result supported the hypothesis ( $t(298)=3.05$ ;  $p<.02$ ). See Table 2.

**Table 2: Self reported intensity of psychosomatic reactions to examination stress among participants with high, average and low pre-examination anxiety level by gender**

Pre-examination anxiety level	Women			Men			p
	N	M	SD	N	M	SD	
Low	29	27.31	13.93	35	25.17	11.47	NS
Average	80	41.81	14.99	95	32.18	12.79	<.001
High	41	53.90	15.77	20	36.50	15.84	<.001
TOTAL	150	42.31	17.42	150	31.12	13.35	<.001

*Hypothesis 3: Women will report experiencing stronger psychosomatic reactions to examination stress than men.*

The mean self reported intensity of psychosomatic reactions to examination stress among female students was 42.31 (SD= 17.41; median=43). Mean score obtained by male participants was 31.12 (SD=13.34; median=29).

T Test was used to verify if the intensity of psychosomatic reactions to examination stress reported by women was significantly higher than men. The result was statistically significant ( $t(298)=6.24$ ;  $p<.001$ ).

*Hypothesis 4: Women will report experiencing more types of psychosomatic reactions to examination stress than men.*

The association between the frequency of experiencing each type of psychosomatic reaction to examination stress and gender was examined using the Chi squared test. Female students most often experienced symptoms related to the autonomic nervous system (e. g. hot or cold flashes, excessive perspiration, sweaty hands, mouth dryness). 61.8% of women reported experiencing those symptoms in the situation of examination stress, in comparison to 34% of men. Gender differences were significant ( $\chi^2=8.49$ ;  $df=1$ ;  $p<.001$ ). The second most frequent type of psychosomatic reactions to examination stress were symptoms in the central nervous system (e.g. headaches, sleeplessness or excessive sleepiness, apathy, constant fatigue). They were experienced by almost half of female students in comparison to 36% of male ones. Gender differences in the frequency of experiencing those symptoms in the situation of examination stress were also significant ( $\chi^2=4.41$ ;  $df=1$ ;  $p<.03$ ). 38% of women in comparison to only 12% of men reported experiencing psychosomatic reactions in the peripheral nervous system (e.g. chills, trembling hands, muscles tension) when facing examination stress. Chi squared analysis showed there were significant gender differences ( $\chi^2=27.04$ ;  $df=1$ ;  $p<.001$ ). Psychosomatic reaction in the cardiovascular system (e.g. heart action disturbances, palpitation, dizziness, hot flashes) were reported by 21% of female participants and only 9% of men. Again, the gender differences were statistically significant ( $\chi^2=8.62$ ;  $df=1$ ;  $p<.001$ ). Psychosomatic reactions experienced the least often by female students were symptoms in the digestive system (for example, nausea, diarrhoea or constipation, abdominal pain, vomiting, lost or increasing of appetite) and respiratory system (e.g. shortness of breath, fainting). Only 17% of female respondents and respectively 3% and 6% of males reported experiencing them in the situation of examination stress. Despite of the fact that generally those symptoms occurred among not many students, the gender differences were still significant (respectively:  $\chi^2=17.29$ ;  $df=1$ ;  $p<.001$  and  $\chi^2=8.49$ ;  $df=1$ ;  $p<.001$  ).

*Hypothesis 5: Women will more often use emotional self-control strategies in relation to examination stress, which are associated with higher intensity of psychosomatic reactions than men.*

To test the hypothesis we determined first, which emotional self-control strategies were associated with higher self reported intensity of psychosomatic reactions to examination stress. Table 3 shows the mean self reported intensity of psychosomatic reactions among men and women who did and did not use each strategy.

**Table 3: Self reported intensity of psychosomatic reactions to examination stress and using emotional self-control strategies by gender**

	Do use							Do not use						
	Women			Men				p	Women			Men		
Emotional self-control strategy	N	M	SD	N	M	SD			N	M	SD	N	M	SD
Reappraisal of emotogenic stimulant	101	40.67	17.67	101	29.58	13.45	<.001	49	45.70	15.63	49	34.28	13.45	<.001
Calming auto verbalizations	90	43.03	17.94	115	30.64	13.25	<.01	60	41.23	16.68	35	32.38	13.71	<.001
Active evasion of negative emotions stimulants	90	41.61	18.08	95	29.00	13.34	<.002	60	43.66	16.46	55	34.78	12.64	<.001
Active coping	61	45.29	18.14	105	30.91	12.85	<.001	89	40.26	16.70	45	31.60	14.47	<.001
Focusing on something else	53	42.38	17.85	106	31.56	14.40	<.001	97	42.48	17.27	44	30.04	13.30	<.001
Postponing of activity	100	38.19	15.98	110	31.14	13.00	<.001	50	50.56	17.39	40	31.05	14.41	<.001
Suppressing of emotional reactions	68	39.77	16.81	92	31.16	13.11	<.001	82	41.29	17.72	58	31.05	13.82	<.002
Violent relief of negative emotions	69	41.98	18.86	101	29.91	13.38	<.001	81	42.59	16.20	49	33.61	13.05	<.001
Using social support	99	43.33	17.35	76	31.91	13.54	<.001	51	40.33	17.53	74	30.31	13.17	<.001
Suppressing of emotogenic verbalizations	101	40.07	16.40	112	29.48	13.16	<.002	49	46.93	18.68	38	35.94	12.87	<.001

The mean self reported intensity of psychosomatic reactions to examination stress was higher among users of eight out of ten emotional self-control strategies. T Tests were used to determine which results are statistically significant (see Table 4).

**Table 4: T Test results: Self reported intensity of psychosomatic reactions to examination stress and using emotional self-control strategies (whole sample).**

<b>Emotional self-control strategy</b>	<b>t</b>	<b>df</b>	<b>p</b>
Reappraisal of emotogenic stimulant	2.41	298	0.01
Calming auto verbalizations	- 0.97	298	0.32
Active evasion of negative emotions stimulants	- 2.12	298	0.03
Active coping	- 2.16	298	0.03
Focusing on something else	0.04	298	0.96
Postponing of activity	- 3.63	298	0.001
Suppressing of emotional reactions	- 0.85	298	0.39
Violent relief of negative emotions	- 2.30	298	0.02
Using social support	- 2.06	298	0.03
Suppressing of emotogenic verbalizations	- 3.72	298	0.001

Using six emotional self-control strategies in the situation of examination stress was associated with significantly higher self reported intensity of psychosomatic reactions to examination stress: ‘active evasion of negative emotion stimulants’, ‘active coping with problems’, ‘postponing of activity’, ‘ using social support’, ‘violent relief of negative emotions’ and ‘suppressing of emotogenic verbalizations’.

Further analysis with Chi squared tests showed that women tended to use three of the six emotional self-control strategies associated with higher intensity of psychosomatic reactions significantly more often than men (see Table 5).

40.7% of women in the situation of examination stress reported using ‘active coping with problem’ (e.g. ‘When I face the problem I would rather do anything to deal with it than wait until it all somehow get sorted out’), in comparison to 30% men. Female participants stated using ‘violent relief of negative emotions in order to reduce tension’ (e.g. ‘When I am stressed out I often explode for no apparently good reason’) significantly more often than

male respondents (respectively 54% and 32.7%). The third strategy associated with higher intensity of psychosomatic reactions to examination stress used more often by women was 'searching for social support' (e.g. 'When I have problems I turn to my friends searching for advise and support'); 66% of female students admitted engaging this strategy when facing examination stress, in comparison to 50.7% of men.

**Table 5: Chi square test results: Gender related frequency of using emotional self-control strategies associated with higher self reported intensity of psychosomatic reactions.**

<b>Emotional self-control strategy</b>	<b><math>\chi^2</math></b>	<b>df</b>	<b>p</b>
Active evasion of negative emotions stimulants	0.35	1	0.55
Active coping	3.73	1	0.05
Postponing of activity	1.58	1	0.20
Violent relief of negative emotions	13.90	1	0.001
Using social support	7.25	1	0.001
Suppressing of emotogenic verbalizations	1.95	1	0.16

*Hypothesis 6: Women's higher pre-examination anxiety level mediates the occurrence of stronger psychosomatic reactions to examination stress among female students.*

Multivariate analysis of variance (MANOVA) was conducted to examine the contribution of gender to pre-examination anxiety level and its relationship to gender specific psychosomatic reactions to examination stress. The MANOVA result was statistically significant [ $F(2,297)=19.46$ ;  $p<.001$ ] which supports the assumption that there was covariance between variables. The univariate  $F$ -tests for each variable were conducted to examine these effects: Gender on the intensity of psychosomatic reactions:  $F(1,299)=39.03$ ;  $p<.002$ ; gender on pre-examination anxiety level:  $F(2,298)=9.32$ ;  $p<.001$

*Hypothesis 7: Women's propensity to apply emotional-self control strategies (those associated with the higher intensity of psychosomatic reactions) mediates factor higher intensity of psychosomatic response to examination stress among female students.*

Factorial ANOVA was applied. The only effect that was statistically significant was for gender: ( $F(1,299)=24.62$ ;  $p<.001$ ). The interactions between gender and emotional self-control strategies applied in the situation of examination were not significant, suggesting there



was no interactive influence of the use of emotional self control strategies on the intensity of psychosomatic reactions to examination stress.

## **Discussion**

This study has confirmed that there are significant gender differences in pre examination anxiety level and the intensity and type of psychosomatic reactions to examination stress among university and secondary school students. Female students respond to the exam situation with stronger anxiety and more intense stress related psychosomatic reactions. Why this should be so may lie in several factors related to examinations as stimuli, as well as gender differences in responding to such stimuli. We examine these two factors in turn.

The intensity of psychosomatic reactions to stress depends on many situational and individual factors: the characteristics of a stressful situation, its controllability (Terelak, 2002), novelty, its influence on persons' aims and aspirations (Lazarus, 1986), and coping abilities, especially the ability to deal with physiological correlates of stress (Lazarus, 1986). All those factors indirectly influence the intensity of stress (Lazarus, 1986). The higher intensity of stress is positively correlated with the higher intensity of psychosomatic reactions to this stress (Kiecolt-Glaser and Glaser 1991; Kiecolt-Glaser, et al 2002; Reykowski, 1976; Terelak, 2002). The level of stressfulness of examinations is a result of person's subjective assessment of this situation. This assessment is modified by numerous factors associated both with the subject and the situation, so the perceived stressfulness may differ for each person, and between person's facing the same examination. Variation in perceived stressfulness may be due to many features of the examination situation. First, novelty can introduce unpredictability, which may be a source of anxiety. Second, students have preferences regarding the form of examination. If the examination's style is different than person's preference (for example a student who is prone to social anxiety who is facing an oral examination) the situation can become very stressful. Recent study by Woodfield, Earl-Novell and Salomon (2005) showed that students of both genders seem to prefer coursework assessment over examination. Nevertheless female students achieve higher grades than male despite of the assessment mode and student's personal preference. Perhaps women are more concerned about their academic achievements and its potential consequences and therefore, if the form of examination is expected to be different than preferred, they are more stressed and respond with stronger psy-

psychosomatic reactions in comparison to their male students. Since in Poland students' assessment is mostly through unseen examinations, this can be another factor contributing to females' higher pre examination anxiety level and more intense psychosomatic reactions in response to examination stress. Another factor is the difficulty of the examination. Difficulty is associated with the features of the subject, the student's capability and proficiency in the certain discipline, as well as the clarity of presenting the material by lecturer and transparency of examination requirements. Sometimes up to the point of receiving the examination question the person does not know what to expect and this uncertainty can increase stress levels. Some people have a hard time working effectively under time pressure. It is hard to predict how complex and detailed will be examination questions and how much time a student would need to give a precise answer. For some students the awareness that the clock is ticking can be a source of anxiety and focusing on this fact makes it even worse. Finally, for most students being educated is crucial to achieving important life goals and self-fulfillment. Failing an exam or poor performance can be perceived as an obstacle in accomplishing essential goals (both learning and mastery) and thus can cause a lot of tension (Was, 2006). Moreover every examination implies assessment. An examiner directly assesses a person's knowledge and performance, but from the student's point of view this assessment may also indirectly impact on self concept and self esteem (talents, competence, intelligence etc). The discrepancy between certain elements of self concept and the examiner's evaluation can be a source of strong negative emotions.

An examination is a source of stress, so it is not surprising that the present study provided the evidence that pre-examination anxiety level is strongly correlated with self reported intensity of psychosomatic reaction to examination stress. Also, pre-examination anxiety level is significantly higher among women. This study showed that women not only experience stronger psychosomatic reactions to examination stress but also a bigger range of those reactions. Female students reported experiencing all the types of psychosomatic responses significantly more often than males; listed in descending order: psychosomatic reactions in autonomic nervous system, central nervous system, peripheral nervous system, cardiovascular system, digestive system and respiratory system. The type of psychosomatic reactions to stress is mostly determined by a person's characteristics and individual physiological reactivity; i.e. a concentration on somatic symptoms or receptiveness to a particular kind of symptoms (Sosnowski, 2002). Women, in comparison to men may be more concentrated on their physiological reactions, and therefore they are able to recognize even minor symptoms.

Many studies have demonstrated that in stressful situations (also examination) women tend to use different emotional self-control strategies than men (Day and Livingstone, 2003; Lee and Larson, 1986; Lok and Bishop, 1999; Tice and Bratslavsky, 2000). In this study, it was shown that female students, in comparison to males, use more often three of six emotional self-control strategies that are associated with stronger psychosomatic response to examination stress: 'active coping with problems', 'violent relief of negative emotions in order to reduce tension' and 'seeking social support'. However, further analysis provided evidence that there were no interactive influence of the gender and the use of emotional self control strategies on the intensity of psychosomatic reactions to examination stress.

The obtained results showed however that pre-examination anxiety level characteristic of women is a factor mediating the occurrence of stronger psychosomatic reactions to examination stress among female students. The level of pre-test anxiety seems to influence not only the intensity of psychosomatic reactions to examination stress but also the quality of female students' performance. The recent study conducted by Chapell et al (2005) has shown that women with lower pre-examination anxiety level have higher GPA than high test anxious female students. Yet there is no significant GPA's differences between high and low test anxious male students.

Although female students' have higher level of pre examination anxiety (Chapell et al, 2005; Woodfield, Earl-Novell and Salomon, 2005) their academic achievements are higher than male. The study by Bouffard et al (1995) showed that academic performance is associated with learning goal, self-regulation and performance goal. Better grades were achieved by the students having high concerns with both learning and performance and employing more self-regulatory strategies. More female students were classified in this profile and their overall academic achievements were higher in comparison to male students. Perhaps women, in comparison to men are more focused important life goals and they view education as a mean to accomplish those. Since any failure is considered an obstacle in fulfilling their aspirations, female students are highly concerned with learning goals and self pressured to perform, hence they report higher level of pre-examination anxiety and psychosomatic reactions to examination stress in comparison to male students.

*Limitations of this study*

The presented study has two main methodological weaknesses. First of all three of four tools used in the survey were designed by the author. Although the pilot study was conducted and internal consistency reliability was established using Cronbach's Alpha the sample size (N=150) was too small and alpha values too low to assure measurement reliability. Moreover, self report questionnaire were used to assess the intensity and the type of psychosomatic reactions to examination stress. A social desirability bias cannot be ruled out. Very few men admitted experiencing strong psychosomatic reactions to examinations stress, moreover women reported to experiencing all the psychosomatic reactions significantly more often than men. According to current stereotypes, men are not supposed to be overwhelmed by strong emotions, they should stay cool, calm and collected (Conway, 2005; Kelly, Hutson-Comeaux, 2000). Also showing physical symptoms as a reaction to stressful situations is not considered very manly (Kelly, Hutson-Comeaux, 2000). On the other hand the stereotype of women being much more prone to stress and its negative outcomes (both psychological and physiological) brings more acceptance for women expressing their reactions to stress (Kelly, Hutson-Comeaux, 2000), so it is possible that female participants were more honest describing their psychosomatic reactions to examination stress.

It seems that high pre-examination anxiety level is a potential risk factor mostly for women. Thus female students should be assisted to prevent and control examination stress, leading to better performance and lowering the risk of stress related psychosomatic disorders. Developing appropriate intervention strategies would require further research to establish the psychological factors contributing to high pre-examination anxiety among female students.

## References

- Adler, N., Matthews, K. (1994). Health Psychology: Why some people get sick and some stay well? *Annual review of psychology*, 45, 229-259.
- Averill, J.R. (1999). Nieodpowiednie i odpowiednie emocje. In: P. Ekman & R.J. Davidson (Ed.), *Natura emocji – podstawowe zagadnienia* (pp. 227-231). Gdańsk: Gdańskie Wydawnictwo Psychologiczne.
- Bachen, E.A., Manuck, S.B., Marshland, A.L., Cohen, S., Malkoff, S.B., Muldoon, M.F. & Rabin, B.S. (1992). Lymphocyte subset and cellular immune responses to a brief experimental stressor. *Psychosomatic Medicine*, 54, 673-679.
- Bouffard, T., Boisvert, J., Vezeau, C. & Larouche, C. (1995). The impact of goal orientation on self-regulation and performance among college students. *British Journal of Educational Psychology*, 65, 317-329
- Brosschot, J.F., Benschop, R.J., Godaert, G.L.R., De Smet, M.B.M., Olf, M., Heijnen, C.J. & Ballieux, R.E. (1992). Effects of experimental psychological stress on distribution and function of peripheral blood cells. *Psychosomatic Medicine*, 54, 394-406
- Bryant, F.B. (1989). A four – factor model of perceived control: avoiding, coping, obtaining and savoring. *Journal of Personality*, 57, 773 – 797.
- Calvo M.G. & Carreiras M. (1993). Selective influence of test anxiety on reading processes. *British Journal of Psychology*, 84, 375 - 388
- Caudell, K.A. & Gallucci, B.B. (1995). Neuroendocrine and immunological responses of women to stress. *Western Journal of Nursing Research*, 17, 672-692.
- Chapell, M.S., Blanding, M., Silverstein, M.E., Takahashi, M., Newman, B., Gubi, A. & McCann, N. (2005). Test anxiety and academic performance in undergraduate and graduate students. *Journal of Educational Psychology*, 97, 268-274.
- Cohen S. & Herbert T.B. (1996). Health Psychology: Psychological factors and physical disease from the perspective of human psychoneuroimmunology. *Annual Review of Psychology*, 4, 113 - 142.
- Conway, A.M. (2005). Girls, aggression and emotion regulation. *American Journal of Orthopsychiatry*, 75, 334-339.
- Day, A.L. & Livingstone, H.A. (2003). Gender differences in perception of stressors and utilization of social support among university students. *Canadian Journal of Behavioral Science*, 35, 73-83.

- Doliński, D. (2002). Mechanizmy wzbudzania emocji. In: J. Strelau (Ed.), *Psychologia. Podręcznik akademicki*. (pp. 319-351). Gdańsk: Gdańskie Wydawnictwo Psychologiczne.
- Fincham F.D., Hokoda A.& Sanders R. (1989). Learned helplessness, test anxiety and academic achievement: a longitudinal analysis. *Child Development*, 60, 138-145.
- Forgas, J.P. (2000). Managing moods: toward a dual – process theory of spontaneous mood regulation. *Psychological Inquiry*, 11, 172-177.
- Gross, J.J. (1998). Antecedent – and response – focused emotion regulation: Divergent consequences for experience, expression and physiology. *Journal of Personality and Social Psychology*, 74, 224-237.
- Gross, J.J. (2000). Emotion regulation in adulthood: timing is everything. *Current Directions in Psychological Science*, 10, 214-219.
- Hembree, R. (1988). Correlates, causes, effects and treatment of test anxiety. *Review of Educational Research*, 58, 47-77.
- Hong, E. & Karstenson, L. (2002). Antecedents of state test anxiety. *Contemporary Educational Psychology*, 27, 348-367
- Huwe S., Hennig J.& Netter P.(1998). Biological, emotional, behavioral and coping reactions to examination stress in high and low state anxious subjects. *Anxiety, Stress and Coping* 11, 47-66.
- Kelly, J.R.& Hutson-Comeaux, S.L. (2000). The appropriateness of emotional expression in women and men: the double – bind of emotion. *Journal of Social Behavior and Personality*, 15, 11-47
- Kiecolt-Glaser, J., Glaser, R. & Robles, T.F. (2002) Psychoneuroimmunology: psychological influences on immune functions and health. *Journal of Consulting and Clinical Psychology*, 70, 537-547.
- Kiecolt-Glaser, J.K. & Glaser, R. (1991). Stress and immune function in humans. In: R. Ader, D.L. Felten, N. Cohen (Ed.), *Psychoneuroimmunology* (pp. 849-869). New York: Academic Press.
- Kiecolt-Glaser, J.K., Cacioppo, J.T., Malarkey, W.B. & Glaser, R. (1992). Acute psychological stressors and short-term immune changes: what, why, for whom and to what extent? *Psychosomatic Medicine*, 54, 680-685.
- Kirshbaum, C., Wust, S. & Hellhammer, D. (1992). Consistent sex differences in cortisol responses to psychological stress. *Psychosomatic Medicine*, 54, 648-657.
- Kofta, M. (1979). *Samokontrola a emocje*. Warszawa: Państwowe Wydawnictwo Naukowe.

- Kosmala, J. (2004). *Reakcje psychosomatyczne osób stosujących różne strategie samokontroli emocjonalnej w warunkach stresu egzaminacyjnego*. Rozprawa doktorska. Uniwersytet im. Adama Mickiewicza w Poznaniu.
- Larsen, R.J. (2000). Toward a science of mood regulation. *Psychological Inquiry*, 11, 129-141.
- Lazarus, R. (1986). Paradygmat stresu i radzenia sobie. *Nowiny Psychologiczne*, 3, 3-39.
- Lee, M. & Larson, R. (1986). Effectiveness of coping in adolescence: the case of Korean examination stress. *International Journal of Behavioral Development*, 19, 851-869.
- Lok, Ch.F. & Bishop, G.D. (1999). Emotion control, stress and health. *Psychology & Health*, 5, 813-828.
- Reykowski, J. (1966). *Funkcjonowanie osobowości w warunkach stresu psychologicznego*. Warszawa: Państwowe Wydawnictwo Naukowe.
- Reykowski, J. (1976). *Eksperymentalna psychologia emocji*. Warszawa: Książka i Wiedza.
- Rusillo, M.T.C. & Casanova P.F. (2004). Gender differences in academic motivation of secondary school students. *Electronic Journal of Research in Educational Psychology* 2(1), 97-112. ([www.investigacion-psicopedagogica.org/revista/english](http://www.investigacion-psicopedagogica.org/revista/english))
- Sosnowski, T. (2002). *Zadania umysłowe, a aktywność sercowo naczyniowa*. Sopot: Gdańskie Wydawnictwo Psychologiczne.
- Terelak, J.F. (2002). *Psychologia stresu*. Bydgoszcz: Oficyna Wydawnicza Branta.
- Tice, D.M. & Bratslavsky, E. (2000). Giving in to feel good: the place of emotion regulation in the context of general self – control. *Psychological Inquiry*, 11, 149-159.
- Was, C. (2006). Academic achievement goal orientation: taking another look. *Electronic Journal of Research in Educational Psychology* 10(4), 529-550. ([www.investigacion-psicopedagogica.org/revista/english](http://www.investigacion-psicopedagogica.org/revista/english))
- Woodfield, R., Earl-Novell, S. & Salomon, L. (2005). Gender and mode of assessment at university: should we assume female students are better suited to coursework and male to unseen examinations? *Assessment and Evaluation in Higher Education*, 30, 35-50.

[This page left intentionally blank]