UNIVERSITY OF TWENTE.

The Relationship between Stress and Mental Health among Students at the University of Twente

B.Sc. Psychology

Christina Wilbert (s1023187)

28.08.2012

1st Supervisor: M. E. Pieterse
2nd Supervisor: L. M. A. Braakman-Jansen

University of Twente, Netherlands
Psychology - Faculty of Behavioral Sciences

Table of content

Summary

The present study aimed to empirically examine the perceived stress and mental health scores of Psychology students at the University of Twente. More specific, it was the goal to see how demographic variables and Stressors that fall under the categories Performance and Workload influence the stress and mental health that is perceived by students. The study used the *Perceived Stress Scale* and the *Mental Health Continuum – Short Form* for the examination of the scores.

It was found that both gender and native language are related to stress. This means that German students perceive more stress than their Dutch fellow students, and that women perceive more stress than their male fellow students. Furthermore, the frequency of failing a course correlates with the perception of stress as well, which might lead to fear in failing, which in turn affects performance.

Introduction

In recent times, the population of students in the Netherlands is steadily increasing, which is shown by statistical data concerning the academic year of 2009/'10, where the number of students grew by 32 thousands, an increase that has never been bigger before (CBS, 2011). Furthermore, a comparison between the academic years of 2005/06 and 2008/09 shows that the amount of German students increased up to 7.4 thousands (CBS, 2010) and a remaining upward trend can be expected. The most popular program turned out to be psychology (CBS, 2010), which is also taught at the University of Twente. As literature reveals, especially students form a population that is prone to stress because they are confronted with a new environment, new responsibilities, and the separation from their parents (Izadinia et. al, 2010, Rosenthal & Schreiner, 2000). A longitudinal study among college students in the U.S revealed that 85% of the students reported to experience stress on a daily basis and an alarming number of undergraduate students has to deal with mental health problems, a consequence of stress (Associate Press, 2009, Aheme, 2001; Hicks & Miller, 2006).

Stress

The concept of stress has its origin in 1936 where it was defined as "the non-specific response of the body to any demand for change" (Selye). More detailed, Stress can be defined as an organism's response to circumstances or events (*stressors*) that threaten the capability to adjust to those conditions (Gerrig, R., Zimbardo, P., 2010). Speaking of stress, most of the people tend to think of it as being a negative thing, although there are two forms and different amounts of stress. The two forms of stress are called *distress* and *eustress* (Gerrig, R., Zimbardo, P., 2010), whereas the latter, eustress, is a positive form and people are likely to experience it if an external event causes high arousal, for example a football game. On the contrary, distress is indeed that form of stress which has negative effects on wellbeing and health.

Among the risks of stress, a difference has to be made between the direct and the indirect effects of stress. While d*irect effects* concern physiological changes (i.e. headache, pain, or weight changes (Bruce, 2009)), which have an influence on the functioning of the immune system, the *indirect impacts* of stress on health are those, which result from behavior as a consequence of stress (i.e. from less sleep, smoking, unhealthy nutrition …) (Morrison and Bennett, 2010) and that are of emotional or mental character (Aheme, 2001; Hicks & Miller,

2006, Bruce, 2009). Because direct/physiological impacts can be very individual and surpass our possibilities to measure them within this study, the present study focuses on the indirect or *reportable* impacts of stress.

Looking specifically at the risks of stress among students, a study in 2009 conducted by the Associate Press showed that 85% of the students experience stress in their daily lives (Associate Press, 2009). The broad impact of stress is demonstrated with the following data: 69% of the students reported to have little energy and feel exhausted, 55% had sleeping problems, 45% recognized a change in eating habits, 42% felt down, depressed, or hopeless and 13% indicated that they were *diagnosed* with a mental health condition. Still 7% thought about committing suicide (Associate Press, 2009). These results can be found in other literature from the American College Health Association (2011) as well, showing that from a sample of 27.774 students, 81,4% felt exhausted, depressed (30,3%) or attempted to commit suicide (1,1%) within the previous year (ACHA, 2012). Furthermore, the highest factor affecting academic performance was stress (28,6%). Another risk of stress among students is the burnout syndrome (Bruce, 2009), "a syndrome of emotional exhaustion, depersonalization, and reduced personal accomplishment" (Maslach, 2003). It can indirect be caused by the sources that account for stress as well, a high workload and few resources that offer effective coping (Neumann, 1990). Among the symptoms of the burnout syndrome, people report feeling hopelessness, overwhelmed, exhausted, lonely, sad, and "so depressed that it was difficult to function" (ACHA, 2012).

Stressors

Apart from the existence of distress, it is also important to find an answer on the question what causes students to perceive stress. As mentioned earlier, the events or circumstances that cause an individual to perceive stress are called stressors and they can be further divided into *'major life events'* or *'daily hassles'* (Gerrig, R., Zimbardo, P., 2010), whereas the latter describes little events in daily life which have a huge effect on wellbeing and health if they add up too much. According to findings from the literature, students' main stressors turned out to be of academic concerns, as workload (77%) or grades (74%), followed by financial issues (64%) (Associate Press, 2009, Goodman, 1993). Furthermore, the fear of academic failure is seen as one of the factors that cause high pressure and stress in students (Kolko, 1980). As these findings suggest, different aspects in students' lives can be thought to act as stressors. The first category where stressors can be assigned to is *workload*, whereas a distinction can be made between university-related workload or additional workload next to

university. During literature study, we found a lot of research that has been done to study university-related workload in terms of too many tasks, exams or too much to read as a main stressor of students. Therefore, our contribution to the topic of stress among students is to look at additional commitments that result in the demands to manage your life in order to maintain control over accomplishments and tasks. The first thing that can be thought to be a factor that contributes to a higher workload of students is having a job. Whereas some students might not have the need to work, others probably have to in order to (partly) finance their study. As mentioned before, financial concerns belong to the top three stressors of students (Associate Press, 2009). We expect that the amount of hours spent on the job is related to performance in university because free time which could be used for studying is spent on working. If there is a relationship between these factors, it can be expected that this, in turn, has an influence on the perception of stress, which can be explained by the fear of failure, which is another stressor among students (Kolko, 1980). As this argumentation shows, a high workload can be seen as the beginning of a chain of consequences, or a chain of stressors. Figure 1 helps to visualize this:

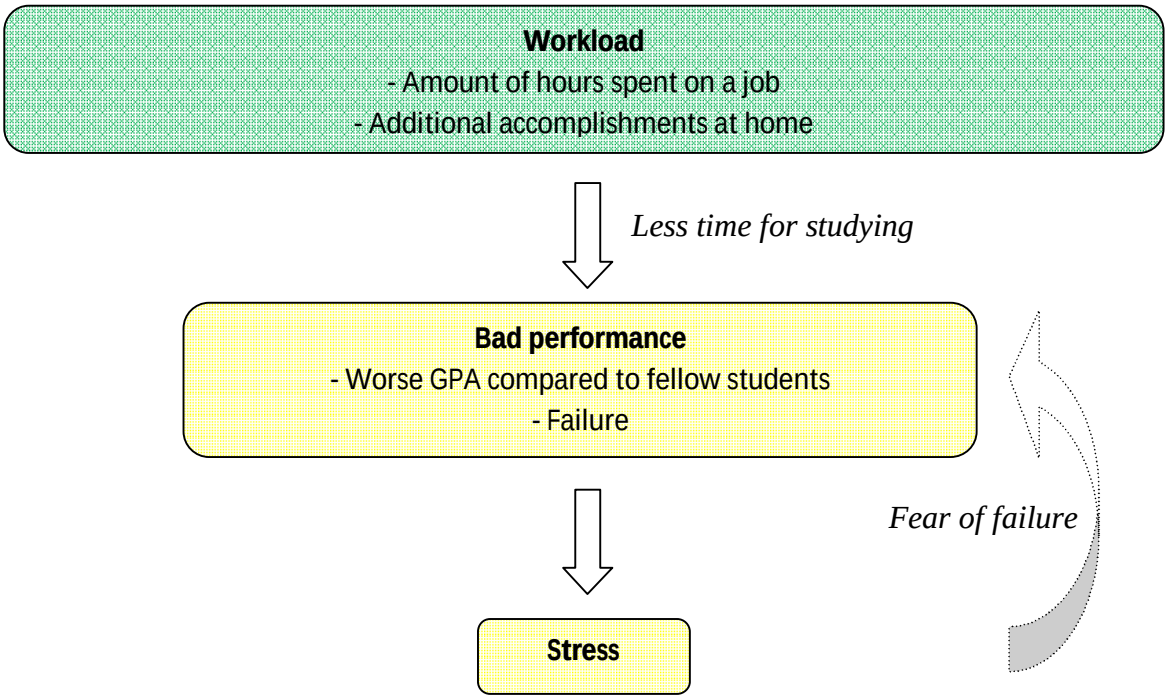

Figure 1 Anticipated causes of stress

Especially stress and performance seem to have a two-directional relationship since stress has shown to be a predictor of bad academic achievement as well. This can be explained with the fear to failure, which might lead to less motivation to study because of past experiences. Another stressor that is mentioned by Burge (2009) is language. His study showed that students who study in a foreign language perceive more stress. A study by Yeh & Inose (2003) matches these findings, showing that low self-perceived English proficiency of international students in the U.S. was associated with greater stress levels. Given the fact that the study program of Psychology at the University of Twente makes use of the languages Dutch and English, all of the enrolled students have to deal at least with English literature, while German students additionally need to learn Dutch. This may lead to the speculation that the stress of international students in the Netherlands is associated with their perceived Dutch proficiency as well.

In summary, in the present study we want to check if life circumstances that can be assigned to the categories *workload* and *performance* are predictors of stress among students at the University of Twente.

Mental Health

In recent times, the concept of Mental Health becomes more and more important and the World Health Organization just recently released a report on adolescence mental health, the age group to which students belong. According to the WHO, Mental Health is defined as "a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community". (World Health Organization, 2001). As it can be seen, the definition makes use of the formulation “stresses of life”, wherefore it seems reasonable to conclude that the concepts of Mental Health and stress are linked to each other by definition. This conclusion is also supported by findings from the literature, stating that stress is associated with poorer mental health (Stead et. al, 2010, Chan, 2009) and showing that students, who report stress also suffer from mental health problems (Associate Press, 2008).

Before going deeper into the definition and theoretical background of mental health, we want to put emphasis on the importance of mental health or the risks of its absence.

The absence of Mental Health carries numerous risks with it and as a consequence, mental illness is likely to occur (Stead et. al, 2010, Chan, 2009). Contrary to the belief that mental illness is the absence of mental health, research showed that the concepts are related but

distinct from each other (WHO, 2012; Keyes, 2005). Literature shows that Mental Health is essential for living a healthy life and people who have mental health problems, or think that they have mental health problems, are advised to seek help (Satcher, 2000). Data from the World Health Organization also shows that the absence of mental health, which is also referred to with the term *mental ill health*, can have fatal consequences. In European countries, 20% of diseases can be explained by mental ill health and among the top 10 countries with the highest suicide rate, 9 countries belong to the European region (WHO, 2012). Literature supports these findings for the group of students. In 2011, 1,1% of students in the U.S, who participated in the National College Health Assessment conducted by the American College Health Association reported that they attempted suicide within the previous year (ACHA, 2012). Suicide frequently results from depression, a mental disorder and the principal cause for adolescent disabilities (WHO, 2012, Izadinia et. Al, 2010)., and can therefore be seen as a consequence of mental health problems. Furthermore, the WHO states that poor mental health is related to lower academic achievement, eating disorders, mood disorders, substance abuse, higher risk for sexual diseases, and violence (WHO, 2012; Buckelew, Yu, English, & Brindis, 2008). According to the World Health Organization (2012), 10-20% of adolescents suffer from mental health problems at some point in their lives.

Back to the theoretical background of mental health, the definition of the WHO includes three categories: well-being, effective functioning of an individual, and effective functioning for a community. In accordance with these categories, Keyes says that mental health is a combination of emotional, social and psychological wellbeing (2002), where *emotional well-being* is the realization of well-being, *social well-being* the realization of effective functioning within a community and *psychological well-being* the effective individual functioning. Furthermore, he makes a distinction between the dimensions "*flourishing*" and "*languishing*", which indicate the manifestation of mental health (Keyes, 2002). While the former refers to a state where an individual scores high on the three dimensions, the latter describes a contrary state, characterized by low levels of social, psychological and emotional well-being. Research showed that languishing individuals are at equal risk of physical disease, healthcare utilization, work productivity, and psychosocial functioning as people who are mentally ill (Keyes, 2002). Adolescence is regarded as the lifespan where promotion of mental health has a critical impact and it is essential for the development in terms of thinking, communication skills, learning, emotional growth, resilience, and self-esteem (Buckelew, Yu, English, & Brindis, 2008).

Summarizing the findings from the literature discussed above, stress and mental health are associated with each other and are related to life quality, which is diminished if an individual perceives stress or lacks mental health. Since the main stressors of students have already been shown to belong to the categories workload and performance, we decided to propose the following integrated model with consideration of demographics, Workload, Performance, Stress and mental health

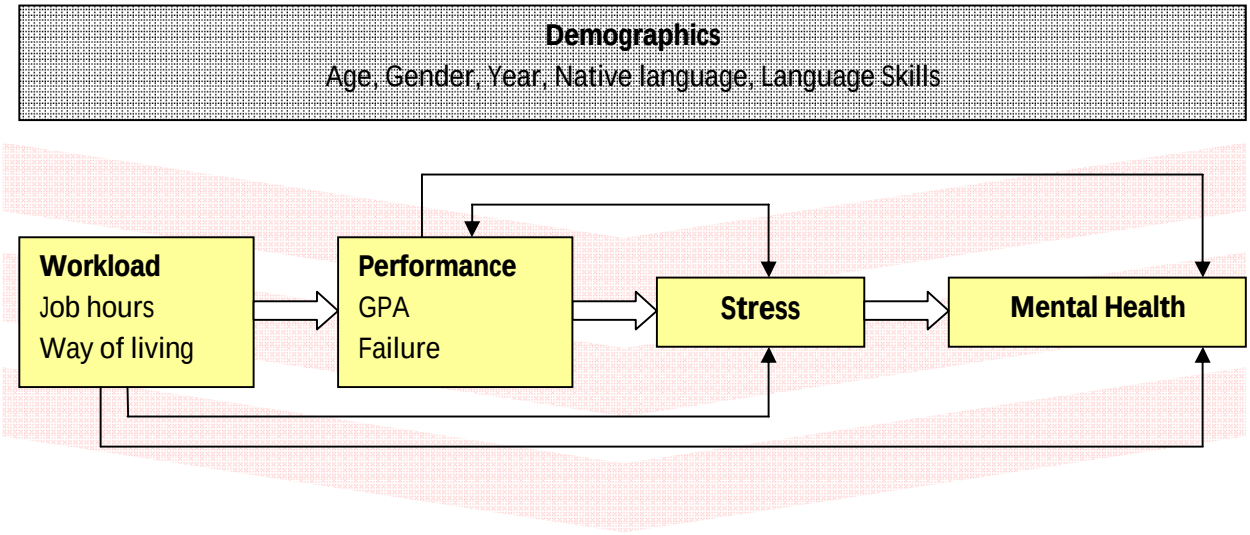

Figure 2 *Proposed model*

The present study covers various research questions which are based on the above proposed model.

1: How much stress is perceived by psychology students at the University of Twente?
2: How do psychology students at the University of Twente perceive their mental health?
3: What is the relationship between the proposed stressors and stress?
4: What is the relationship between the proposed stressors and mental health?
5: What is the relationship between stress and mental health?
6: To what extent is mental health explained by the stressors and stress?
7: Is there a mediating effect of Stress between the proposed predictors of stress and Mental Health?
8: Is there a moderating effect of gender between demographics and stress?

Method

Participants and procedure

Psychology students enrolled at the University of Twente were asked to fill in an online questionnaire. The questionnaire was available on the internet page www.surveymonkey.com, a platform where online surveys can be designed, and it was distributed via e-mails, facebook, and Sona Systems, the platform where students are able to get an overview about in studies which are conducted at the University of Twente and in which they can participate. Since the participation in a special amount of studies is necessary for the completion of the first year within the study of psychology, there was the possibility to be rewarded with a half participation point. The participation points are calculated by the time that is necessary to participate in a study and therefore, it took the respondents 30 minutes to complete the survey. This procedure resulted in a dataset with responses from 144 participants who filled in the questionnaire in May 2012. Since we expected the participation of a lot of first years German students, the survey was conducted in English to secure that there were no problems regarding language comprehension.

Materials

The participants were asked to fill in a questionnaire that was composed of various subparts. First of all, the participants were introduced with a text which explained the topic and the aim of the study. After the introduction, the students had to fill in some questions concerning demographical data in order to get an image of the student's profile.

The second part of the questionnaire concerned the concept of Stress. Next to the amount of perceived stress, which was measured with the *Perceived Stress Scale* invented by Cohen, also background information concerning job, housing, language skills in Dutch and English that possibly could predict *the Perceived Stress Score (PSS)*, and therefore be categorized as a stressor, were part of this section. Two open questions, one concerning university life and the other free time, asked explicitly for factors that they experience as stressful in order to offer space for stressors that were not pre determined by the closed ones. Finally, there was the *Mental Health Continuum – Short Form (MHC-SF)*, which measures mental health. At the end, the participants were asked if they had any problems with answering the questions because of language comprehension and if they would participate in courses that aim to reduce or manage stress. Some questions were programmed logically so that participants

whose native language is Dutch automatically skipped the question about Dutch skills, which was designed for German students. The same procedure was handled with the questions about a job and therefore the students which don't have a job automatically skipped the following job-related questions. At the end of the questionnaire there was the possibility to leave an e-mail address behind if participants were interested in being debriefed afterwards.

Demographic Information and Stressors

In the first part of the questionnaire, participants were asked for demographical data. The participants were asked for their age, gender, their native language and their language skills. The language skills had to be indicated on a 5-point Likert Scale (0=very bad, 1=bad, 2=average, 3=good, 4=very good). Furthermore, they were asked for their year of enrolment (class). First year's students enrolled in 2011, Second year's students in 2010, third year's students in 2009 and fourth year's students in 2008.

The first stressor category we wanted to test was '*Workload*' and the students had to indicate how much hours they spend on a job (0 = Other, 1 = <10, 2 = 10-20, 3 = 20-32, 4 = >32, 5 = no job) and if they work for financial reasons. This made a selection possible between people who only work sometimes and "just for fun" and students who have to go to work on a regular basis because of financial issues. Furthermore, they had to indicate whether they live in the Netherlands or Germany and if they live on their own or not (1 = yes, 2 = no). We expected that students who have to work and keep house as experiencing a higher workload than students who do not have those additional commitments.

The second stressor category we wanted to measure was "*Performance*". Students had to fill in three questions: First, they were asked to fill in their actual achieved European Credit Points (they were allowed to watch this up on their personal proceeding page of OSIRIS, the educational system at the UT and it was voluntary to answer this question). In the second question, they had to report their grade point average (GPA) (1 = 6, 2 = 6-7, 3 = 7, 4 = 7-8, 5 = 8, 6 = >8) of all courses. Finally they were asked to estimate on a Likert-Scale how often they made the experience to fail a course (further called "failing") (0 = never, 1 = seldom, 2 = sometimes, 3 = often, 4 = very often). An analysis of these three variables was conducted beforehand in order to look for the most predictive variable for stress. This revealed that the inter-item correlation of GPA and failing was significant and high (r = .54). For that reason,

we used the variables GPA and failing as our variables for the stressor category "*Performance*".

Perceived Stress Scale

The concept of stress was measured with the *Perceived Stress Scale* (Cohen, 1983). This scale is one of the most popular ones when it comes to the measurement of stress on the base of self-assessment and subjective perception. It is designed for community samples where respondents have at least junior high school education. Given the fact that the formulation of the items is free of specific content, it is possible to use this scale for the population of psychology students. That's why we chose to use this scale as our measurement of stress.
The Perceived Stress Scale shows an internal reliability of α=.78 and regarding validity, "PSS scores were moderately related to responses on other measures of appraised stress, as well as to measures of potential sources of stress as assessed by event frequency." (Cohen and Williamson, 1988) The scale consists of 10 items and respondents have to indicate on a 5-point Likert Scale how often (0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often) they felt a certain way during the last month. The items are:

1. In the last month, how often have you been upset because of something that happened unexpectedly?
2. In the last month, how often have you felt that you were unable to control the important things in your life?
3. In the last month, how often have you felt nervous and "stressed"?
4. In the last month, how often have you felt confident about your ability to handle your personal problems?
5. In the last month, how often have you felt that things were going your way?
6. In the last month, how often have you found that you could not cope with all the things that you had to do?
7. In the last month, how often have you been able to control irritations in your life?
8. In the last month, how often have you felt that you were on top of things?..
9. In the last month, how often have you been angered because of things that were outside of your control?
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

The Perceived Stress Scale is no diagnostic instrument. It's not suitable for an objective judgment about a person's perceived stress – rather, comparisons within the studied sample allow differentiating stress between respondents (Cohen, 1983).

In previous studies, higher total Perceived Stress Scores were associated with the following health outcomes: failure to quit smoking, failure among diabetics to control blood sugar levels, a sensitive immune system and greater vulnerability to depressive symptoms that are evoked through stressful life events (Cohen, 1983). Furthermore, they are associated with a greater risk to suffer from stressful situations with the result of being vulnerable to depressive symptoms (Westerhof, 2008). Other health risks are poorer health practices concerning sleeping rhythm, eating habits or the consumption of addictive substance as alcohol or cigarettes (Cohen & Williamson, 1988). Cohen et al. (1988) found that the PSS correlates with Smoking, help seeking behavior or Self-reported Health.

Mental Health Continuum

The Mental Health Continuum-Short Form (Keyes, 2008) is a brief version of its long counterpart, and it is based on the components of Mental Health that can be found in the definition of the concept through the World Health Organization (2005), emotional, social, and psychological wellbeing (Salama-Younes, 2011).

Within the MHC-SF, these categories are taken into account in order to cover the whole concept of mental health. They divide the MHC-SF into subscales which can be further divided into 14 dimensions. The MHC-SF is composed of 14 items and every item represents one dimension. The internal reliability of the overall MHC–SF Scale is 0.74 (Keyes, 2008). The sub concepts of mental health have already been defined earlier in this text. *Emotional wellbeing* is captured by the first three items, asking for happiness, interest, and satisfaction (Keyes, 2008). *Social wellbeing* is captured by five items (item 4-8) which refers to the individual's acting within a social context. The items ask for social acceptance, social actualization, social contribution, social coherence, and social integration. *Psychological wellbeing* is measured with 6 items (item 9-14) and they ask for self-acceptance, personal growth, the goal in one's life, control over your environment, positive relationships and autonomy. The items described above had to be scored on a 6-point Likert scale, indicating the frequency of those feelings or situations during the last month. The Likert-scale ranges

from *never* (= 0) to *every day* (= 5), with *once or twice* (=1), about once a week (=2), *about 2-3 times a week* (=3), and *almost every day* (=4) in the middle (Westerhof, 2011).

The scores obtained from the MHC-SF can be analyzed in two ways. The first way is to calculate a total mental health score, adding up all the single scores from the 14 items. This results in a total mental health score ranging on a continuum from 0 to 70, expressing the amount of positive mental health. It is further possible to calculate the average scores of the three subscales emotional wellbeing, social wellbeing, and psychological wellbeing. To get the average score of emotional wellbeing, item 1 to 3 are needed, whereas item 4-8 are summed up for social wellbeing and item 9-14 for psychological wellbeing.

The third way is categorical scoring where the respondents are placed into one of the following three different categories: Languishing, flourishing, or moderately mentally healthy (Keyes, 2002). Higher scores indicate greater flourishing (Clarke et al., 2011) and per definition, individuals which are defined as being flourishing can be described as functioning positive, both psychological and social. Furthermore, they experience positive emotions. As it can be seen, the three subscales emotional, social, and psychological wellbeing of the MHC-SF are reflected within the description of "flourishing".

Different from a measurement of life satisfaction, optimism or happiness, flourishing rather concerns behavior and characteristics that are based upon commonly agreed virtues (Seligman, Steen, Park and Peterson, 2005). Languishing, on the contrary, can be described with feelings of emptiness or uselessness (Fredrickson & Lahoda, 2005).

Plan of Analyses

The dataset was analyzed with PASW 18, a statistical software that is used within the study of psychology. In the whole study, an alpha of .05 was used in all tests. First of all, preliminary analyses revealed missing cases and outliers, and therefore further analyses were conducted with a remaining sample of 144 students. For the description of the sample, we used frequency tables for *gender, class, native language, way of housing, country of housing* and *working hours.*

To work with the data from the Perceived Stress Scale, the first thing that had to be done was to recode the data into useful variables for further statistical analyses. Second, the items 4,5,7 and 8 had to be reversed because of their positive formulation. After the items were reversed,

the scores on the items were summed up, which yields a total stress score (StressTotal) ranging from 0 to 40.

Further preliminary analyses were conducted to test the single concepts and the scales we used. To test the reliability of the Perceived Stress Scale and the Mental Health Continuum – Short Form, a reliability analysis was conducted. For the Perceived Stress Scale, Cronbach's alpha was $\alpha = .871$ and the MHC-SF showed a Cronbach's alpha of $\alpha = .881$. According to the definition of Cronbach's alpha, both scales are thus highly reliable and the deletion of an item would not yield a higher reliability.

Furthermore, we looked at the three performance variables in order to choose for the most predictive measurement of the concept. Therefore, a correlation analysis was used to look how the three variables we thought to be representative for performance among students correlate with stress. Next, we looked at the inter-item correlations to see whether there is an underlying relationship between them. The variable "class" was recoded, so that there were the dimensions "risk" group, which was composed of the students who just began their study (2011) and students who are about to graduate (2008 and 2009). The second dimension was "no-risk group" composed of students who enrolled in 2010. This division is based on the findings from previous studies, who found that those students at the beginning or at the end of their study are most prone to the perception of stress.

After the preliminary analyses, tests were conducted to answer the research questions. The analysis process can be structured according to the research questions and their complexity. The first and the second research question have descriptive character and univariate analyses (frequency tables) were used to answer how students perceive their stress and mental health. To answer the other research questions which aimed to analyze the relationships between two or more variables, we used bivariate (i.e. correlations, t-tests) and multivariate (i.e. regression analyses) analyses to answer them.

The third and fourth research questions are related to the relationship between the proposed stressors and stress/mental health. Here, the proposed stressors are demographic information (gender, class, native language, and language skills), GPA, failure, job hours, and the living situation of the students. For the demographic variables gender, native language, class and for the living situation (live alone or not) of the students, independent-samples t-tests were used to compare the means of stress- and MHC-scores. For the variables with more than two dimensions (language skills, GPA, failure and job hours), an ANOVA was used to compare the stress and MHC-scores between the groups.

The fifth research question is related to the relationship between stress and mental health. We used a correlation analysis and an ANOVA to test their relationship.

The sixth research question concerns the proposed model and therefore, a stepwise regression analysis was used to look at the integrated predictive quality of the stressors with stress as the dependent variable. The same was done for the predictive value of the whole model, with mental health as the dependent variable.

For the Seventh and eighth research question, we looked beforehand at the executed analyses to see if there are candidates for moderation or mediation.

Results

Analysis of the performance variables

The present study made use of three different variables which aimed to measure performance. These variables were European Credit points at the time of the participation in our study, which were divided through the possible number of credit points in order to make the performance of the whole sample comparable, the second variable was the frequency of failing a course (Failing) since the beginning of studying and the last variable was the estimated GPA. All of the three variables were self reported and not based on verifiable data.

The correlations between the three different variables and stress were analyzed to decide for the most predictive performance variable that can be used for further analyses. A correlation analysis with the students' total stress score showed to be marginally significant for the relationship between failing and stress, $r\ (144) = 0.16$, $p = 0.052$. Furthermore, failing was significantly correlated with GPA, $r\ (144) = -0.54$, $p < 0.01$, which indicates that both variables tend to measure the same construct. However, the correlation between GPA and perceived stress was only weak, $r\ (144) = -0.14$, $p = 0.102$. The correlation between achieved European Credit Points and the Total Stress Score was non-significant, $r\ (137) = 0.08$, $p = 0.330$.

Apart correlations for the first and third year showed similar findings. For the first year, there was a marginally significant correlation between failing and the total stress score, $r\ (91) = 0.204$, $p < 0.053$ and a marginally significant correlation for GPA and the total stress score, $r\ (91) = -.21$, $p = 0.051$. For the third year's students, there was a significant correlation between failing and the total stress score, $r\ (26) = .422$, $p < 0.05$ and a significant correlation between GPA and the total stress score, $r\ (26) = 0.443$, $p < 0.05$.

There was no significant correlation between the achieved European Credit points at the time of participating in the present study and the total stress score, which is why we chose to exclude this variable from further analyses. Both the self reported frequency of failing a course and the self reported GPA were taken as our measurement of performance for further analyses in the present study.

An analysis of these three variables was conducted beforehand in order to analyze the validity of the concept "Academic Performance". This revealed that the intercorrelation of the GPA and failing was significant and high (r = .54). For that reason, we used the variables GPA and failing as our first stressor, "Academic Performance".

For the ordinal variables gender, native language, and class independent sample t-tests were conducted to compare how stress and mental health differ between the subsamples.

For the nominal variables language proficiency, failing, GPA, Job

Table 1 – *Correlation of Performance Variables with Total Stress Score*

	1	**2**	**3**	**4**
1 ECs	1,00	-0,10	0,19*	-0,08
2 Failing		1,00	-0,54**	0,16
3 GPA			1,00	-0,14
4 Total Stress				1,00

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Descriptive statistics

The description of our sample can be seen in table 2. It consisted of responses from 144 participants from which 20,8% were male and 79,2% were female. Regarding their nationality, 33,3% of the respondents were Dutch and 66,7% were non-Dutch, whereas the non-Dutch sample, with an exception of three students, consisted of German students. With respect to the year of enrolment, 63,2% of the respondents were in their first year, defined as enrolled in 2011, 15,3% in their second year, defined as enrolled in 2010,18,1% in their third year, defined as enrolled in 2009 and 2,1% in their fourth year, enrolled in 2008. The results are summarized in Table 1 and were obtained from a frequency distribution.

The mean age was 21,5, with a minimum age of 18 and a maximum age of 34 (SD = 2.278). The concepts stress and mental health were normally distributed (Stress: M=17,37, SD=6,128, Mental Health: M=42,99, SD=10,49).

Research Question 1: How much stress is perceived by psychology students at the University of Twente?

For the perceived stress scale, the possible total stress score ranges between 0 and 40, whereas a higher score indicates greater stress. In our sample, descriptive statistics revealed that the minimum total stress score was 5 and the maximum score was 30 with a mean score of M = 17.37 (SD = 6.13).

Research Question 2: How do psychology students at the University of Twente perceive their mental health?

For the MHC-SF, the possible total positive mental health score ranges from 0 to 70, with higher scores expressing a better mental health, as measured with the above described scale. In our sample, the scores ranged from 13 to 68 with a mean score of M = 42.9 (SD = 10.49).

Table 2 *Detailed description of our sample*

		Frequency	**%**
Gender	Male	30	20.8
	Female	114	79.2
Class	2008	5	3.5
	2009	26	18.1
	2010	22	15.3
	2011	91	63.2
Native Language	Dutch	48	33.3
	Non-Dutch	96	66.7
Country housing	Netherlands	109	75.7
	Germany	35	24.3
Way Housing	alone	21	14.6
	not alone	123	85.4
Job Hours	other	4	2.8
	<10	14	9.7
	10-20	8	5.6
	20-32	16	11.1
	>32	29	20.1
	no job	73	50.7

Bivariate Analyses

Research Question 3-4: What is the relationship between the proposed stressors and stress/ What is the relationship between the proposed stressors and mental health?

Gender

Descriptive data revealed a mean stress score of 13.77 for male, and a mean score of 18.32 for female students. A t-test showed that the found difference is significant, indicating that female students perceive more stress than their male fellow students, $t(142) = 3.783$, $p < 0.05$.
Regarding mental health, there is no significant difference between men and women in the total mental health score, $t(140)=-.486$, $p > 0.05$.

Native language

Results showed that the mean stress score of the non-Dutch students (M = 18.28) was significant higher than the mean score of the Dutch sample (M = 15.54), $t(142) = -2.579$, $p < 0.01$. For mental health, the mean score did not differ significant between the two samples, $t(142) = -.243$, $p > 0.05$.

Class

The results showed no significant difference for stress, $t(144) = 0.872$, $p > 0.05$ in stress levels and no significant difference in mental health score between the groups, $t(142) = -.794$, $p > 0.05$.

Dutch and English Language proficiency

A correlation revealed that better Dutch skills are associated with less stress, although the correlation was only marginally significant, $r (144) = -0.155$, $p = 0.064$. Further analyses revealed that the people with the “very good” language skills perceive the least stress. A correlation between English skills and stress showed no significant relationship, $r (144) = -0.13$, $p = 0.121$. For mental health, there was no significant difference between the difference language proficiencies.

GPA

There was no significant correlation between GPA and Stress, $r (144) = -0.14$, $p = 0.102$ for the whole sample. GPA did correlate significant with mental health, $r (142) = .169$, $p < 0.05$.

Failing

For mental health, failing showed no significant correlation, r (142) = .119, p = .158 but there was a marginally significant correlation between failing and stress, r (144) = 0.16, p = 0.052.

Table 3: *Correlations between stressors as defined within this study with stress and mental health*

	1	2	3	4	5	6	7	8	9	10	11
1 Gender		-,028	,176*	,000	,175*	-,161	-,076	,040	,021	,303**	,041
2 Country Housing			,051	,298**	-,314**	,028	,046	,005	,100	,051	-,144
3 Way Housing				,125	,020	-,077	-,100	-,083	,142	-,007	,179*
4 Native Language					-,722**	,027	,335**	,020	,171*	,211*	,021
5 Dutch						,047	-,262**	,050	-,076	-,155	,111
6 English							,107	,052	,045	-,130	-,016
7 Job Hours								,047	,053	,044	,048
8 Failing									-,539*	,188*	-,119
9 GPA										-,109	,169*
10 Stress											,422**
11 Mental Health											

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Amount of hours spent on the job

Results show that there is no significant correlation between the amount of time spent for the job during the last month and stress, r (144) = p > 0.05.

Way of Housing

Results of showed that there is no significant difference in stress score between students who live on their own and students who don't live on their own, t(142) = 0.087, p = 0.16. For mental health, there was a significant correlation, t(142) = -2.159, p < 0.05.

Research question 5: What is the relationship between stress and mental health?

The correlation between stress and mental health was highly significant, r (144) = -0.422, p < 0.01, explaining 17.8% of the variance of mental health (R^2 = .178). A further look at the gender specific differences revealed that there is a higher correlation between stress and mental health for male r (29) = -0.554, p = 0.02 than for female students r (113) = -0.439, p < 0.01.

Stress and Subscales MHC-SF

Since the MHC-SF is composed of three subscales that aim to cover the three dimensions of mental health, emotional, social and psychological wellbeing, it is interesting to analyze their relationship with stress. A correlation analysis revealed that emotional wellbeing is the most associated with stress, $r(142) = -0.462$, $p < 0.001$.

Multivariate Analyses

As it can be seen in table 4, the demographic variables already explain 15.6% of the variance of stress ($p < 0.001$). After adding the stressors GPA and failing that can be assigned to the category "Performance", there is a R^2 change of .04, resulting in a model that explains 19.6% of the variance of stress.

Research Question 6: To what extent is mental health explained by the stressors and stress?

Table 5 shows the hierarchical regression analysis that was conducted for the proposed model. As it can be seen, the demographic variables can only explain 3.8% of the variance of mental health. GPA and failing add some explanatory value to the variance of mental health (6.6%). Adding job and way of housing to the model, 9.3% of the variance of mental health can be explained. In the last step we entered stress, which results in a model that explains 27.1% of the variance of mental health.

The same regression analysis was conducted for the female and male sample only. This revealed that for male students, after adding finances (Blog 3) it predicts 47.1% of the variance of mental health. The total model explains 62.3% of the variance of mental health ($p = 0.01$). For females, the model predicts 26.1% of the variance of mental health.

Research Question 7: Is there a mediating effect of Stress between stressors and Mental Health?

As it can be seen in blog 4 in table 5, the addition of stress to the model results in a drop of the Beta scores of year, Dutch skills, GPA, failing, job and way of housing. This could be an indicator of an effect of these variables that is mediated through stress. But since the prerequisite of a mediation is that the variable shows a significant regression coefficient with the proposed mediator and the dependent variable, we didn't conduct the analysis because the requirements were not fulfilled.

Table 4 *Multiple Regression Analysis with Stress as dependent variable*

		ß	**R^2**	**df**	**F**	**p**	**R^2 change**
Blog 1	Gender	.31	.156	5	5.118	.000	.156
	Year	-.09					
	Native Language	.16					
	Dutch	-.07					
	English	-.07					
Blog 2	Gender	.30	.196	7	4.733	.000	.039
	Year	-.11					
	Native Language	.16					
	Dutch	-.08					
	English	-.08					
	GPA	-.06					
	Failing	.16					
Blog 3	Gender	.31	.203	9	3.784	.000	.007
	Year	-.12					
	Native Language	.20					
	Dutch	-.06					
	English	-.08					
	GPA	-.05					
	Failing	.16					
	Job	-.02					
	Way Housing	-,087					

Research Question 8: Is there a moderating effect of gender between failing and stress?

As discussed earlier, the relationship between gender and stress is significant. A moderation analysis was conducted to test if the effect of a demographic variable gets more significant with the interaction of gender.

As it can be seen in table 6, job has no significant relationship with stress but the interaction with gender results in an very high change in significance of the relationship with stress, r (142) = .22, p = 0.015.

Table 5 *Multiple Regression Analysis with Mental Health as dependent variable*

		ß	R^2	df	F	p	R^2 change
Blog 1	Year	.06	.038	5	1,062	.384	.038
	Gender	-.01					
	Native Language	.20					
	Dutch	.25					
	English	-.04					
Blog 2	Year	.07	.066	7	1,358	.228	.028
	Gender	-.01					
	Native Language	.18					
	Dutch	.25					
	English	-.04					
	GPA	.12					
	Failing	-.08					
Blog 3	Year	.09	.093	9	1,495	.156	.026
	Gender	-.02					
	Native Language	.11					
	Dutch	.21					
	English	-.04					
	GPA	.09					
	Failing	-.08					
	Job	.09					
	Way Housing	.16					
Blog 4	Year	.03	.271	10	4,875	.000	.179
	Gender	.13					
	Native Language	.21					
	Dutch	.19					
	English	-.08					
	GPA	.07					
	Failing	-.01					
	Job	.08					
	Way Housing	.12					
	Stress	-.47					

Table 6 *Moderation Analysis with Stress as dependent variable*

	Standardized ß	**t**	**p**
Gender	.29	3,092	,002
Native Language	.13	1,060	,291
Year	-.11	-1,283	,202
Dutch	-.10	-,823	,412
English	-.09	-1,078	,283
Job	.02	,227	,821
Gender*Year	.11	1,306	,194
Gender*Dutch	-.04	-,310	,757
Gender*Engl	-.11	-1,314	,191
Gender*Job	.22	2,474	,015
Gender*Native	.02	,173	,863

Discussion

This study was designed to get a better understanding of the relationship between Stress, its predictors and the relationship with mental health.

The Scores from the Perceive Stress Scale range between 0 and 40. As the results show, the mean stress score among Psychology students who participated in the present study was 17.37. The scores are normally distributed with a lowest score of 5 and a highest of 30. An important thing regarding the results from this study is that the scores retained from the Perceived Stress Scale are cross-sectional and therefore the scores should not form the base for further interpretations regarding the health of the students. Since there was a relatively long chance to fill in the questionnaire, it might be possible that some of the respondents experienced higher stress due to examination period. This, in turn, might result in distorted variables and in future studies, it should be considered that the surveys are filled in when stress is relatively low (e.g. at the beginning of a semester).

Because the results are very time dependent, it might thus be critical to use the data from this study as an indicator for the amount of stress that is perceived by students. Examination weeks or deadlines can increase the level of stress in a very short time.

Regarding gender, the analyses showed that female perceive more stress than their male fellow students. This is in accordance with the literature, which shows that women perceive more stress than men (Misra & Castillo, 2004). Although female students perceive more stress, the relationship between stress and mental health is not as big as among their male

fellow students. The problem with this result is that the male sample was much smaller and therefore it is difficult to conclude the meaning for possible different interventions. In future studies, it would be interesting to answer the same research questions with two equal sample sizes.

The negative point about this result is that the two samples were not of equal size, as mentioned in the descriptive data. The same is valid if the sample is divided according to their year of enrolment. Most of the students were first- or third years students but literature shows that especially those two groups are the students that are prone to high levels of stress (Pancer et. al , 2000) because they either just started studying and have to adapt to a new environment, which is perceived as being very stressful, or they are about to graduate and unsure about their future. We could not find a significant difference between the risk and the non-risk group, which does not support the findings from literature but can maybe be assigned to the fact that the first year's students participated at the end of their first year, and were therefore already familiar with the new situation and life circumstances.

Regarding the students' mother language or nationality, there is a significant difference between the stress levels of Dutch and non-Dutch students. This may indicate that findings from literature, which state that the language proficiency of international students is associated with stress (Yeh & Inose, 2003).

The correlation between performance and stress was significant ($r = .188$, $p < 0.05$). This underlines findings from the literature, which claim that the two concepts are related to each other (Eliot et al., 2005) but is conflicting with the results from another study, which showed that their correlation is negative and weak (Elias et al., 2011).

Since students had to indicate how often they made the experience to fail a course or what their average grade is, the concept of "performance" might underlie different biases. It might, for example, be possible that the concept is not covered completely or that their self-reported grades are better than they really are because of social desirable answers or memory bias.

The problem that the concept might not be fully covered can be illustrated with the following example: A student might have a low average grade throughout the first year but passed all the courses. Within this item, he is one of the students, whose performance is weak. On the contrary, a student who often made the experience of failing a course, but yields a very high grade for the second try would be one of the students with a "bad" performance as well – according to the item used. Future studies should therefore focus on a better measurement of performance in order to achieve valid results.

Finances was captured by the motivation to work. Whether students have a job because of financial reasons or not was used as an indicator of financial concern. Here it is also the question whether some people indicate that they work for financial reasons, even though they don't have financial problems. The money gained could be seen as a bonus or compensation, not as the reason to work.

The relationship between workload and stress was non-significant. This is controversial to literature, which shows that workload is indeed associated with stress (ACHA, 2011). The problem here might be that, again, the item was not able to measure the student's whole workload. It was just one indicator of whether students have to follow extra commitments next to their study but their might of course be students, which have a high workload although they don't have a job. Although literature showed that there is a difference in stress perception between students who live with their parents and student who don't, our study didn't yield the same conclusion.

Even if the items can be improved in future studies, I think that the proposed model is worth to be further examined, already because of its explanatory value for the variance of mental health.

The last regression analysis showed that our proposed model can predict 27.1% of the variance of mental health. Regarding the proposed stressors only, the model can only predict 9.3%, which is not much. Therefore, it seems that there are other things next to our proposed stressors that account for a person's mental health. Furthermore, our study was cross-sectional and the results do not account for mental health of students in general.

In the future, it can be considered to implement stress management programs into the curriculum of psychology, since literature shows that bad performance and high workload, which is frequently described by students, indeed have a negative influence on the perception of stress and burnout. Furthermore, the present study showed that stress and mental health are related with each other and that students who perceived more stress had a worse positive mental health score than those who didn't perceive that much stress. This should be seen as a motivation to offer the prevention of mental ill health.

References

Aheme, D. (2001). Understanding students stress: A qualitative approach. *Irish Journal of psychology, 22, 176-187.*

American College Health Association. American College Health Association – National College Health Assessment II: Reference Group Executive Summary Fall 2011. Hanover, MD: American College Health Association, 2012.

Bruce, S. P. (2009). Recognizing stress and avoiding burnout. *Currents in Pharmacy Teaching and Learning*, 1, 57-64.

Clarke, A., Friede, T., Putz, R., Ashdown, J., Martin, S., Blake, A., . . . Stewart-Brown, S. (2011). Warwick-Edinburgh Mental Well-being Scale (WEMWBS): Validated for teenage school students in England and Scotland. A mixed methods assessment. *BMC Public Health, 11*(1), 487.

Cohen, S., Kamarck, T., and Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24,* 386-396.

Cohen, S. and Williamson, G. Perceived Stress in a Probability Sample of the United States. Spacapan, S. and Oskamp, S. (Eds.) *The Social Psychology of Health.* Newbury Park, CA: Sage, 1988.

Cooper, C. L., Rout, U., & Faragher, B. (1989). Mental health, job satisfaction, and job stress among general practitioners. *BMJ, 298*(6670), 366-370. doi: 10.1136/bmj.298.6670.366

Elias, H., Ping, W. S., & Abdullah, M. C. (2011). Stress and Academic Achievement among Undergraduate Students in Universiti Putra Malaysia. *Procedia - Social and Behavioral Sciences, 29*(0), 646-655. doi: 10.1016/j.sbspro.2011.11.288

Goodman, E.D. (1993). *How to handle the stress of being a student.* Imprint, 40: 43.

Hamaideh, S. H. (2011). Stressors and reactions to stressors among university students. *International Journal of Social Psychiatry*, *57*(1), 69-80.

Hicks, T. & Miller, E. (2006). College life style, life stressors and health status: differences along gender lines. *Journal of College Admission,* 192: 22 – 29.

Izadinia, N., Amiri, M., Jahromi, R. g., & Hamidi, S. (2010). A study of relationship between suicidal ideas, depression, anxiety, resiliency, daily stresses and mental health among Tehran university students. *Procedia - Social and Behavioral Sciences, 5*(0), 1615-1619. doi: 10.1016/j.sbspro.2010.07.335

Kalra, G., Christodoulou, G., Jenkins, R., Tsipas, V., Christodoulou, N., Lecic-Tosevski, D., . . . Bhugra, D. (2012). Mental health promotion: Guidance and strategies. *European Psychiatry, 27*(2), 81-86. doi: 10.1016/j.eurpsy.2011.10.001

Keyes, C. L. M. (2002). The mental health continuum: From languishing to flourishing in life. *Journal of Health and Social Behavior*, 43, 207–222.

Keyes, C. L. M. (2005). Mental illness and/or mental health? Investigating axioms of the complete state model of health. *Journal of Consulting and Clinical Psychology,* 73, 539–548.

Keyes, C. L. M. (2007) Promoting and Protecting Mental Health as Flourishing, *American Psychologist* p 95-98.

Kolko, D. J. (1980). *Stress Management Techniques for Graduate Students: Cognitive Coping, Problem Solving and Time Management.* Paper presented at the annual meeting of the Southeastern Psychological Association, March, 1980, Washington, D.C. ED 192 230.

Mallinckrodt, B. & Leong, F. (1992). International graduate students, stress and social support. *Journal of College Student Development,* 33, 71-78

Maslach C. Burnout: The Cost of Caring. Cambridge, MA: Malor Books; 2003.

Nandamuri, P. P., & Ch, G. (2011). Sources of Academic Stress, A Study on Management Students, Journal of Management and Science, 1, 31-42.

Neumann, Y and E., and A. Reichel,(1990). *Determinants and Consequences of Students' Burnout in Universities,* Journal of Higher Education, Vol. 61, No. 1 (January/February 1990).

Satcher, D. (2000). Mental health: A report of the Surgeon General--Executive summary. *Professional Psychology: Research and Practice, 31*(1), 5-13. doi: 10.1037/0735-7028.31.1.5

Salama-Younes, M. (2011). Validation of the Mental Health Continuum Short Form and Subjective Vitality Scale with Egyptian Adolescent Athletes. The Human Pursuit of Well-Being. In I. Brdar (Ed.), (pp. 221-234): Springer Netherlands.

Seligman M. E., Steen T. A., Park N. & Peterson C. (2005) Positive Psychology Progress - empirical validations of interventions. *American Psychologist*

Stead, R., Shanahan, M. J., & Neufeld, R. W. J. (2010). "I'll go to therapy, eventually": Procrastination, stress and mental health. *Personality and Individual Differences, 49*(3), 175-180. doi: 10.1016/j.paid.2010.03.028

Westerhof, G. J., & Keyes, C. L. M. (2008). Geestelijke gezondheid is meer dan de afwezigheid van geestelijke ziekte [Mental health is more than the absence of mental illness]. *Maandblad Geestelijke Volksgezondheid*, 63, 808–820.

Westerhof, G., & Keyes, C. (2010). Mental Illness and Mental Health: The Two Continua Model Across the Lifespan. *Journal of Adult Development, 17*(2), 110-119. doi: 10.1007/s10804-009-9082-y

World Health Organization. (2005). Promoting mental health: Concepts, emerging evidence, practice. Geneva: WHO

Yeh, C. J. & Inose, M. (2003). International students' reported English fluency, social support satisfaction, and social connectedness as predictors of acculturative stress. *Counseling and Psychology Quarterly, 16, 15-28.*

Online References:

CBS (2011). More employed develop burnout symptoms. Online: URL: http://www.cbs.nl/en-GB/menu/themas/arbeid-sociale-zekerheid/publicaties/artikelen/archief/2011/2011-3493-wm.htm?Languageswitch=on (07.05.2012)

CBS (2010). Many Germans in Dutch higher education. Online: URL: http://www.cbs.nl/en-GB/menu/themas/onderwijs/publicaties/artikelen/archief/2010/2010-3022-wm.htm?Languageswitch=on (07.05.2012)

CBS (2011). Jaarboek onderwijs in cijfers 2011. Online: URL: http://www.cbs.nl/NR/rdonlyres/FC6D3388-0F9E-4129-8F2B-53022BA3F774/0/2011f162pub.pdf (07.05.2012)

World Health Organization (2012). Mental Health. Online: URL: http://www.euro.who.int/en/what-we-do/health-topics/noncommunicable-diseases/mental-health