Mental Health of International Students: Prevalence and Predictors of Mental Disorders and Symptom Severity

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Abstract

Background: The number of international university students has dramatically increased during the last decades, being Germany one of the major host countries. Although it has been suggested that international students may be at higher risk for the development of mental disorders compared to domestic students, only few studies have examined the mental health of this population. Therefore, the present study aimed to estimate the prevalence rates of mental disorders [major depressive disorder (MDD), other depressive disorder, somatoform disorder and anxiety disorder], the symptom severity and the course of symptoms over time among the population of international students, and to explore if there are significant differences between this group and German students. Furthermore, potential predictors of mental disease (demographic characteristics, neuroticism, extraversion, social support, stress, resilience, traumatic life events, positive and negative life experiences) were examined.

Methods: The study included a cross-sectional design (T1) and a follow-up assessment (T2), using an online survey developed for data collection. The samples for T1 included 712 international and 2662 German students. At T2, 112 international students and 488 German students participated in the study. Measurement invariance for neuroticism, extraversion, social support and resilience was tested using structural equation modeling. While logistic regression analyses were conducted including observed variables, linear regressions included also latent variables.

Results: Results showed high prevalence rates of mental disorders among both international and German students at T1. The minority of the students suffering from a mental disorder were receiving mental health treatment. Compared to German students, international students showed significantly lower scores of neuroticism, extraversion and social support. Furthermore, international students had significantly higher stress levels, more traumatic life events and higher scores of negative life experiences. Full scalar invariance was established for extraversion, social support and resilience and partial scalar invariance for neuroticism. When controlling for the effect of covariates, international students were at higher risk for MDD, somatoform disorder, anxiety disorder and for more severe depressive, somatic and anxiety symptoms. Higher neuroticism and higher stress levels stood out as core predictors of mental disorders at T1. Additionally, gender, lower age, social support and traumatic life events were also associated with several outcome variables. Core predictors of a poorer course of symptoms at follow-up were the severity of symptoms at T1 and current stress levels.

Conclusions: The findings indicated that mental disorders are prevalent among the population of international and German students, being international students at higher risk for mental illness. Neuroticism and stress levels were main predictors of the development of mental disorders and more severe symptoms. The severity of symptoms and current stress levels were found to be main predictors of the curse of symptoms over time. Furthermore, the results indicated that international and German students differed regarding several important aspect that can influence mental health. These results strongly indicated that prevention, detection and treatment of mental disorders among university students and especially among international students should be a priority. It would be important to evaluate the actual offer in mental health services provided by the universities and to identify potential factors that are acting as barriers for receiving treatment among these populations. Future research assessing this problematic can help to increase the knowledge about the mental health of international and domestic university students. Evidence-based programs for prevention and treatment of specific mental problems of international and domestic students should be developed and evaluated.

Zusammenfassung

Hintergrund: Die Anzahl internationaler Hochschulstudierenden hat sich in den letzten Jahrzehnten drastisch erhöht, wobei Deutschland eines der bedeutendsten Länder für ausländische Studierende zu sein scheint. Obwohl bislang vermutet wurde, dass ausländische Studierende einem höheren Risiko für die Entwicklung psychischer Störungen im Vergleich zu einheimischen Studierenden ausgesetzt sind, haben bisher nur wenige Studien die psychische Gesundheit dieser Population untersucht. Aus diesem Grund hat die vorliegende Studie zum Ziel, die Prävalenz psychischer Störungen (Major Depression (MD), anderer depressiver Störungen, somatoformer Störungen und Angststörungen), den Schweregrad der Symptome und den zeitlichen Verlauf der Symptome in der Population ausländischer Studierenden einzuschätzen und zu erforschen, ob signifikante Unterschiede zwischen dieser Gruppe und deutschen Studierenden besteht.

Methoden: Die Studie basiert auf einem Querschnitts-Design (T1) und einer nachfolgenden Katamnese-Erhebung (T2). Die Datenerhebung erfolgte internetbasierend. Die Stichproben für T1 beinhalteten 712 ausländische und 2662 deutsche Studierende. Zum Zeitpunkt T2 nahmen 112 ausländische Studierende und 488 deutsche Studierende an der Studie teil. Die Messinvarianz von Neurotizismus, Extraversion, sozialer Unterstützung und Resilienz wurde mittels Strukturgleichungsmodellen getestet. Während logistische Regressionsanalysen mit beobachteten Variablen durchgeführt wurden, beinhalteten lineare Regressionen auch latente Variablen.

Ergebnisse: Die Ergebnisse zeigten hohe Prävalenzraten psychischer Störungen sowohl bei ausländischen, also auch bei deutschen Studierenden zum Zeitpunkt T1. Nur die Minderheit derjenigen Studierenden, die an einer psychischen Störung litten, erhielt eine Behandlung. Im Vergleich zu deutschen Studierenden zeigten ausländische Studierende signifikant geringere Werte an Neurotizismus, Extraversion und sozialer Unterstützung. Darüber hinaus wiesen internationale Studierende ein signifikant höheres Stressniveau, mehr traumatische Lebensereignisse und höhere Werte negativer Lebenserfahrungen auf. Skalare Invarianz wurde für Extraversion, soziale Unterstützung und Resilienz und partielle Skalare Invarianz für Neurotizismus festgestellt. Nach Kontrolle der Effekte der Kovariaten zeigten internationale Studierende ein höheres Risiko für Major Depression, somatoforme Störungen und Angststörungen und für schwerwiegendere depressive, somatische und angstbezogene Symptome. Hoher Neurotizismus und höheres Stressniveau zeichneten sich als Hauptprädiktoren für psychische Störungen zum Zeitpunkt T1 ab. Zusätzlich standen

Geschlecht, jüngeres Alter, soziale Unterstützung und traumatische Lebensereignisse auch mit mehreren abhängigen Variablen im Zusammenhang. Hauptprädiktoren für einen ungünstigen Symptomverlauf zum Zeitpunkt der Katamnese bestanden aus der Schwere der Symptome zu T1 und dem aktuellen Stressniveau zu T2.

Schlussfolgerungen: Die Befunde wiesen darauf hin, dass psychische Störungen in der Population ausländischer und deutscher Studierenden prävalent sind, wobei ausländische Studierende einem höheren Risiko für eine psychische Erkrankung ausgesetzt sind. Neurotizismus und Stressniveau waren Hauptprädiktoren für die Entwicklung von psychischen Störungen und schwerwiegenderen Symptomen. Der Schweregrad der Symptome und das aktuelle Stressniveau wurden als Hauptprädiktoren für den Verlauf der Symptome über die Zeit identifiziert. Es is außerdem bedeutsam, dass die Ergebnisse darauf hinwiesen, dass ausländische und deutsche Studierende sich bezüglich mehrerer wichtiger Aspekte unterschieden, die die psychische Gesundheit beeinflussen können. Diese Ergebnisse wiesen nachhaltig daraufhin, dass die Prävention, Diagnostik und Behandlung psychischer Störungen unter Hochschul-Studierenden und besonders unter internationalen Studierenden Priorität haben sollten. Es wäre wichtig, das aktuelle Angebot im Gesundheitssystem, das von den Universitäten bereitgestellt wird, zu evaluieren, und potentielle Faktoren zu identifizieren, die als Hindernisse dafür fungieren, eine Behandlung zu erhalten. Zukünftige Forschung sollte dazu beitragen, den Wissensstand über die psychische Gesundheit von internationalen und einheimischen Studierenden zu erweitern. Evidenz-basierte Programme zur Prävention und Behandlung studentenspezifischer psychischer Probleme sollten für einheimische and ausländische Studierende entwickelt und überprüft werden.

1 Theoretical background

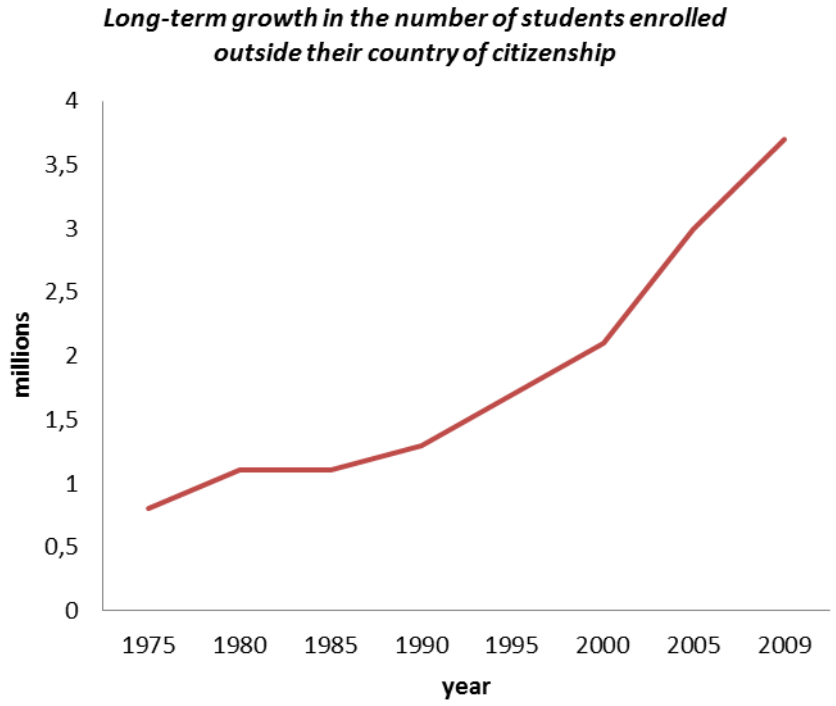
1.1 General situation of international students

1.1.2 International students in the world: Facts

In the most recent of the Organization for Economic Cooperation and Development (OECD) (OECD, 2011), international education indicators were published including a description of the situation of international students in tertiary education. The following section will give an overview of the most relevant information about international students worldwide contained in this report.

In the last decade, there has been a dramatic increase of tertiary international students enrolled outside their country of origin. According to the OECD, by 2009 3.7 million of tertiary students were enrolled outside their home country, corresponding to an increase of 77% (average annual growth rate of 6.6%) since the year 2000 (see Figure 1).

Figure 1



Note. Source: OECD and UNESCO Institute for Statistics. Adaptation from OECD (2011): In *Education at a Glance 2011: OECD Indicators*: OECD Publishing.

Many reasons are involved in the process of deciding to study abroad. For example, the desire to know other cultures and languages, or the search for better perspectives in the labor market and research (OECD, 2011). The decision to go abroad may also be supported by the internationalization of labor markets, and the increasingly easiness for travelling and living abroad in general. Regarding the destination, there are several factors that international students take into account when deciding in which country they want to study. Language, as might be expected, is an important criterion, therefore countries with widely used languages (e.g. English, German, French, Spanish) tend to be preferred. Other factors that may influence the destination are immigration policies, the academic prestige of the hosting institution, recognition of degrees, admission requirements, geographical reasons, links between countries, and future job opportunities. Another important factor usually taken into account is the monetary cost of being enrolled abroad. In Germany for example, international students coming from EU and non-EU countries are equally treated as domestic students regarding tuitions fees (depending on each state or Bundesland), which are of relatively low cost in comparison to other countries (e.g. United Kingdom).

Due to all these factors, Europe is the favorite location to study abroad, followed by North America. Specifically, in 2009 Germany was the third major destination for international students, being the destination of 7% of all the international students in the world (OECD, 2011).

Regarding to the country of origin, most of the international students come from Asia or Europe (OECD, 2011).

1.1.3 International students in Germany: Who are they?

As stated before, Germany plays an important role in the international education market. In accordance with this leading position, there has been a growing tendency towards the internationalization of German universities. During 2010, 244777 international students were enrolled at German higher education institutions (5600 more than in 2009), accounting for 11.5% of all enrolled students in the country: 8.5 % had the status of Bildungsausländer (international students who gained their higher education entrance qualification at a foreign school), and the remaining 3% had the status of Bildungsinländer (foreign students who have earned a German Abitur either in Germany or at a German school in another country). Among all of the federal states in Germany, Saarland, Bremen, Berlin, Hessen, Baden-Württemberg, Nordrhein-Westfalen and Hamburg showed an above-average number of international

students enrolled at higher education institutions. Particularly in Baden-Württemberg, the number of Bildungsausländer increased in the last years, currently representing 9.6% of all its higher education students (DAAD, 2011).

According to the last report of the German Academic Exchange Service (DAAD), more than half of the international students (Bildungsausländer) studying in Germany come from another European country, a third of them from Asia. Considering single countries, the majority of international students come from China, followed far behind by Russia, Poland and Bulgaria. Among students coming from Western Europe, the majority come from Austria, France, Italy, Spain and Luxemburg. From Africa, most of the international students come from Morocco, Cameroon and Tunisia (DAAD, 2011).

In relation to the reasons to study in Germany, international students enrolled at higher education institutions have reported their interest in the German language and culture as main factors. Other important arguments are the better career opportunities offered in Germany, the possibility to have access to specialist knowledge, the possibility to obtain an international degree, and the good reputation and study conditions of higher education institutions in Germany (DAAD, 2011).

Concerning the field of studies, most of the international students in Germany are enrolled in languages courses and cultural studies, law, economics and social sciences. Among all of them, 62% are pursuing their first degree, 28% are graduate students, and 7% are pursuing partial studies (for a limited period) (3% of data not known).

Additionally, most of the international students in Germany organized their studies independently (81%) and not as part of a mobility or exchange program (Isserstedt & Kandulla, 2010).

1.1.4 Problems and concerns of international students

Although every student has to deal with a variable amount of stress derived both from the academic life and from normal developmental concerns (psychological autonomy, economic independence and identity formation) (Toyokawa & Toyokawa, 2002), international students additionally have to deal with the challenges of the adaptation to a new culture in a foreign country, and in a new social and educational environment (Poyrazli, Thukral, & Duru, 2010). During the process of studying, international students may face more difficulties than domestic students while having access to fewer resources, and with less access to social

support systems (Pedersen, 1991). The author also suggests that international students may experience significant stress levels because of the pressure of learning role behaviors in the new culture, which can be a source of identity diffusion and role conflict.

Tseng and Newton (2002) have proposed four major categories of key adjustment problems that international students may face: general living adjustment (e.g. housing, transportation, adaptation to a new climate), academic adjustment (e.g. language skills, new educational system), socio-cultural adjustment (e.g. having difficulties in adjusting to social and cultural customs, norms and regulations of the host country, racial discrimination) and personal psychological adjustment (e.g. experiencing homesickness, loneliness, loss of status or identity). Other problems that may contribute to their psychological distress include intrapersonal factors such as sense of loss, sense of inferiority and uncertainty, as well as interpersonal factors like communication problems, culture shock and loss of social support systems (Sandhu, 1994). Other primary concerns reported by American university students studying abroad (mostly in European countries) include fitting in a new society, academic achievement, and communication and language skills (Ryan & Twibell, 2000).

According to the report of the Federal Ministry of Education and Research, international students in Germany reported understanding the academic system, the problem of financing their studies, and difficulties meeting German students as main difficulties (Isserstedt & Kandulla, 2010). Along the same lines, international students in a German university reported the German language, difficulties contacting German students and unfamiliarity with the German study system as major problems (Deutsch & Gäbler, 2006).

1.2 Mental disorders

The outcome variables in the present study included the diagnose of major depressive disorder (MDD), other depressive disorder, somatoform disorder and other anxiety disorder as well as the severity of depressive, somatic and anxiety symptoms. Therefore, in the present section relevant mental disorders are described including the diagnostic criteria according to the DSM-IV (American Psychological Association, 1994) as well as prevalence rates, followed by the presentation of information about the mental health of international students.

1.2.1 Diagnostic and prevalence of mental disorders

1.2.1.1 Major depressive disorder and other depressive disorders

General description

Depressive disorders are common, often chronic and recurrent highly burdensome psychiatric conditions. In fact, depression is listed as the leading global cause of years lost due to disability, according to the World Health Organization, in both males and females (World Health Organization, 2008).

The central feature of depressive disorders is a disturbance in mood (defined as a pervasive and sustained feeling tone that is experienced internally and that influences a person's behavior and perception of the world), but they also include many other psychological and physical symptoms (Kaplan & Sadock, 1998).

According to international classifications (DSM-IV), depressive disorders include major depressive disorder, dysthymic disorder, and depressive disorder not otherwise specified (American Psychological Association, 1994).

For the diagnosis of major depressive disorder the presence of one “major depressive episode” is required. The central characteristic of a major depressive episode is a period of at least 2 weeks of depressed mood or anhedonia (loss of interest or pleasure in nearly all activities), plus at least four other additional symptoms that include changes in appetite or weight, sleep, psychomotor activity, decreased energy, feelings of worthlessness or guilt, difficulty thinking, concentrating or making decisions, and recurrent thoughts of death or committing suicide.

For the diagnosis of dysthymic disorder, although the clinical picture does not constitute a full major depressive episode, nonetheless a depressed mood is required to be present for most of the days for at least two years, plus at least two additional symptoms: abnormal eating behavior, sleep disturbances, low energy or fatigue, low self-stem, poor concentration or difficulties making decisions, and feelings of hopelessness.

The third category of depressive disorders is depressive disorder not otherwise specified, which includes disorders with depressive features (including psychological and physical symptoms) that are not enough to constitute a major depressive disorder or dysthymic disorder.

For all of these diagnoses, it is required that symptoms cause a significant distress or impairment in important areas of functioning.

According to the measurement instrument used in the current study, depressive disorder not otherwise specified and dysthymia will be included in a single category called "other depressive disorder" (please see the methods section for details).

Prevalence

Among the general population, results from an epidemiological study including a large community sample of more than 37000 participants from ten different countries indicated that lifetime prevalence of major depressive episodes varied from 3% in Japan to 16.9% in the U.S. The twelve-month prevalence varied from 1.2% in Japan to 10% in the U.S. As expected, results also showed high rates of recurrence (Andrade, et al., 2003).

Another study conducted in a large sample of civilian adults in the U.S. (N = 9090) showed a lifetime prevalence of 16.2% for MDD and of 6.6% in 12 months (Kessler, et al., 2003).

In a recent review and reanalysis of data from 30 European countries, prevalence rates of mental disorders in Europe were estimated. According to the results and the 12-month prevalence rate for MDD (6.9%), this disorder was found to be one of the most prevalent among people from 14 to 65 years and the most important contributor to burden of disease. Results also indicated that females were more likely to have a MDD (OR = 2.3) and were more affected than men according to the disability adjusted life year (DALY) index (Wittchen, et al., 2011).

There are only few studies that report prevalence rates of mental disorders in university students that are not limited to a particular group (e.g. medical students). Results of a study including a large random sample of university students in the U.S. (N = 2843) showed a prevalence of 5.2% and 4.1 % for MDD among undergraduates and graduates students, respectively. The prevalence for other depressive disorder was 8.6% among undergraduates and 7.2% among graduates (Eisenberg, Gollust, Golberstein, & Hefner, 2007). In a random sample of Spanish university students (N = 559), 5.3% and 10.4% of male and female students respectively were diagnosed as experiencing a major depressive episode (Vazquez & Blanco, 2008). In a sample of university students in Nigeria (N = 1206), 5.6% of the students met criteria for minor depressive disorder and 2.7% for MDD using the Mini International Neuropsychiatric Interview (MINI) (Adewuya, Ola, Aloba, Mapayi, & Oginni, 2006). Furthermore, a study assessing the prevalence of common mental disorders of 1130 university

students in Germany showed that 6.1% of the total sample screened positive for a MDD and 8.1% for other depressive disorder using the Patient Health Questionnaire (PHQ-D). Male and female students did not differ significantly in the prevalence rates of these mental disorders (Bailer, Schwarz, Witthoft, Stubinger, & Rist, 2008).

1.2.1.2 Somatoform Disorder

General description

Somatoform disorders are common mental disorders particularly in the general medical setting (please see further). The core feature is the presence of a myriad of physical symptoms that suggest a general medical condition, but cannot be fully explained by a medical condition (or other mental disorders). In the DSM-IV, somatoform disorders include somatization disorder, conversion disorder, pain disorder, hypochondriasis, body dysmorphic disorder, undifferentiated somatoform disorder and somatoform disorder not otherwise specified (American Psychological Association, 1994).

The unexplained symptoms people with somatoform disorders present often lead to difficult encounters with the health care system, resulting in more frequent office visits, unnecessary laboratory tests, or costly (and potentially dangerous) invasive procedures. The lack of an "organic cause" and the chronicity of the symptoms are usually accompanied with important suffering, and might also lead to other mental disorders, like depression or anxiety. Somatoform disorders are a challenge for any physician and can be particularly resistant to any treatment (Allen & Woolfolk, 2010; Kroenke, 2007).

Individuals with somatization disorder suffer from a number of recurring and multiple vague physical symptoms, involving different physical functions or parts of the body, usually starting during youth or early adulthood. According to international classifications (American Psychological Association, 1994), the somatic complaints must begin before age 30 and occur over the course of several years. During any time of the course of the disorder, there must be present at least four pain symptoms on four different sites or body functions (e.g. head, abdomen, back, joints, etc.), two gastrointestinal symptoms other than pain (nausea, vomiting, diarrhoea, etc.), one sexual symptom (sexual indifference, irregular menses, excessive menstrual bleeding, etc.) and one pseudoneurological symptom.

For the diagnosis of undifferentiated somatoform disorder, the presence of one or more physical complaints, presented for at least 6 months, is required.

For both somatization disorder and undifferentiated somatoform disorder, the physical symptoms cannot be attributed to medical conditions or to the use of drugs, and the symptoms must cause a clinically significant distress or impairments in several areas of functioning (social, occupational, etc.).

For the present study and according to the used measuring instrument, the diagnosis of somatoform disorder is not delimitated to a specific disorder but refers principally to the diagnoses of somatization disorder and undifferentiated somatoform disorder according to the DSM-IV (see the methods section for more details).

Prevalence

The prevalence of somatoform disorders has not been as extensible studied as for depression. Most of the available studies have been conducted in clinical samples, and there are only few population-based studies. According to the results of a recent review that estimated the 12-month prevalence of several mental disorders in the European Union (EU), the prevalence rate for somatoform disorder ranked number three with an observed median of 6.3%. Regarding gender differences, females were more likely to have a somatoform disorder than males (*OR* = 2.1) (Wittchen, et al., 2011).

Findings from a nationwide German mental health survey in a representative sample of non-institutionalized adults (*N* = 4181) revealed that the four-week and 12-month prevalence rate for any somatoform disorder based on fully structured computer assisted clinical interviews (M-CIDI) was 7.5% and 11%, respectively. Specifically, the four-week and 12-month prevalence rate was 4.9% and 7.1% for males and 10% and 15% for females, the age of onset being mostly in adolescence and early adulthood (Jacobi, et al., 2004).

In Germany, a study conducted by Bailer et al. (2008) in a large sample of students at a German university found that 9.1% of students met diagnostic criteria for a somatoform disorder, with female students being significantly more likely to screen positive for this disorder.

1.2.1.3 Anxiety disorders

General description

Anxiety disorders are one of the most prevalent mental disorders (please see further), are associated with significant morbidity and are often chronic and resistant to treatment (Kaplan & Sadock, 1998).

According to international classification systems (DSM-IV), anxiety disorders include panic disorder, agoraphobia, specific and social phobias, obsessive-compulsive disorder, posttraumatic stress disorder, acute stress disorder, generalized anxiety disorder, anxiety disorders due to general medical conditions, substance-induced anxiety disorder, and anxiety disorder not otherwise specified.

The essential symptom of generalized anxiety disorder is excessive anxiety and worry (apprehensive expectation), occurring more days than not for a period of at least 6 months about a number of events or activities, that the person experiences as difficult to control, associated with three or more of a list of symptoms (restlessness, fatigue, difficulty concentrating, irritability, muscle tension, and sleep disturbances)

Anxiety disorder not otherwise specified includes disorders with clinically significant and prominent anxiety (or phobic avoidance) that do not meet criteria for any other specific anxiety disorder.

In the present study and according to the screening instrument used to assess mental disorders, it will be explore the presence of generalized anxiety disorder and anxiety not otherwise specified, which were combined into the single category “other anxiety disorder”.

Prevalence

According to the results of the review and analyses conducted by Wittchen et al. (2011), the 12-month prevalence of generalized anxiety disorder in the EU was estimated to be 1.7% for adults between 14 and 65 years and 3.4% for the elderly (65+ years). Females were more likely to present this diagnosis than males (*OR* = 2.1).

Results from a nationwide study in the general population in Germany showed that the four-week and 12-month prevalence rate for the diagnosis of generalized anxiety disorder was 1.2% and 1.5% respectively, with females more frequently being diagnosed than males (Jacobi, et al., 2004).

In the student population, the study conducted by Eisenberg et al. (2007) in a large random sample of university students in the U.S. found that 2.9% of undergraduate students and 3.1% of graduate students were diagnosed with a generalized anxiety disorder using the PHQ. Undergraduate and graduate females were more frequently affected than males. Results of a study in a random sample of female university students in Spain (N = 1054) indicated a prevalence rate for current generalized anxiety disorder of 2.7% and of 0.7% for anxiety disorder not otherwise specified (Vazquez, Torres, Otero, & Diaz, 2011). According to the prevalence rates of mental disorders of a campus-wide survey at a German university, 2.9% of the students who took part in the study met diagnostic criteria for other anxiety disorder using the Patient Health Questionnaire (PHQ-D), being significantly more frequent in females than males (Bailer, et al., 2008).

1.2.2 Mental health in international students: What do we know so far?

The answer to this question is very succinct: almost nothing.

In fact, only a few number of studies have examined epidemiological data on international students regarding mental health, with a few reports on the presence and predictors of stress, and a noticeable scarcity on mental health outcomes. This lack of literature is particularly striking if two aspects are taken into account. First, it has been reported that university students present a high prevalence of mental disorders (Bailer, et al., 2008; Bayram & Bilgel, 2008; Vazquez, et al., 2011). Secondly, there is a large body of literature that clearly indicates a relationship between migration and mental disorders [e.g. depression (Conrad & Pacquiao, 2005; da Silva & Dawson, 2004)].

As has been stated before, international students are a migrant population who face particular problems, suggesting that this population might be at high risk for developing mental disorders. In fact, the few studies conducted so far have suggested that while being abroad, international students often experience a detriment of mental health. In the study conducted by Bhugra et al. (2004) international students had high rates of anxiety and depression. In the study conducted by Furukawa et al. including a sample of 277 Japanese international exchange high school students, high levels of psychiatric symptoms were found among participants during their stay abroad, especially in association with low availability of social support (Furukawa, Sarason, & Sarason, 1998).

Importantly, despite the fact that there are indications that international students might suffer from mental health problems and therefore being in need of psychological assistance, there is a notorious pattern of underutilization of mental health services by this population (Bradley, Parr, Lan, Bingi, & Gould, 1995; Yakushko, Davidson, & Sanford-Martens, 2008). Additionally, results from a study showed that international graduate students were also less likely to use counseling services than domestic graduate students (Hyun, Quinn, Madon, & Lustig, 2007). To explain this phenomenon, several factors have been suggested, such as cultural differences in basic beliefs regarding mental health problems, unfamiliarity with the concept of counseling, and stigmatization (Mori, 2000). For example, past research has shown that international students might tend to express psychological problems through somatization in order to evade the stigma attached to seeking help in their native culture (Kuo & Kavanagh, 1994). Other reasons for the underutilization of mental health services include negative expectations, fear that they will be sent home as failures, and lack of awareness about resources available at the university system (Mori, 2000).

1.3 Potential predictors (risk and protective factors) for mental disorders

In the following section, the factors that can potentially contribute to the appearance or prevention of mental disorders will be described. The existing literature examining the relationship between these factors and mental health in international students will also be presented.

1.3.1 Personality traits: Neuroticism and Extraversion

1.3.1.1 Theory and description of personality traits: The Five Factor Model (FFM)

Personality traits can be defined as "dimensions of individual differences in tendencies to show consistent patterns of thoughts, feelings, and actions" (McCrae & Costa, 1990, p.23). The Five Factor Model (FFM) is a consensual integrated taxonomy of personality that provides a widely accepted framework for research and further studies (Digman, 1990; McCrae & John, 1992). The origin of the FFM derives from analysis of terms in the natural language, namely, trait descriptive adjectives which people use to describe themselves and others (Goldberg, 1993; John & Srivastava, 1999; Kotov, Gamez, Schmidt, & Watson; McCrae, et al., 2000). Thus, the FFM does not represent a particular theoretical perspective

(John & Srivastava, 1999), but allows an integration of different systems of personality description (John, Naumann, & Soto, 2008).

The FFM establishes that personality traits can be organized in five basic dimensions or "Big Five" traits: Neuroticism, Extraversion, Openness to experience, Agreeableness, and Conscientiousness. The idea that personality can be organized hierarchically from a large number of specific traits to a reduced number of more general characteristics contributed to the success of this integrated classification (Goldberg, 1993; Markon, Krueger, & Watson, 2005). This approach does not established that personality can be reduce to only these five traits, but each dimension summarizes a large number of more specific personality characteristics (John & Srivastava, 1999).

The FFM has been supported by many studies (McCrae & John, 1992). The results suggest that the FFM is robust and reliable across different types of samples, raters, and methodological variations of factor analysis for diverse sets of variables (John & Srivastava, 1999). Although there are other Big Trait models, all can be derived from the Big Five model and have a single common structure (Clark & Watson, 1999). Moreover, several studies have been conducted including different languages and cultures showing similar results (Allik, 2005; Barret, 1998; McCrae & Costa, 1997; Somer & Goldberg, 1999).

Currently, the FFM is the most widely used and accepted descriptive model of personality within psychology. Two of these five dimensions or factors, neuroticism and extraversion, have been included in most of the studies which included the FFM and are higher order factors in every major personality taxonomy structure (John, 1990). Furthermore, neuroticism and extraversion can be seen as stable general temperamental dimensions (Clark, Watson, & Mineka, 1994) that may have a strong heritable component (Hettema, Neale, Myers, Prescott, & Kendler, 2006; Viken, Rose, Kaprio, & Koskenvuo, 1994). Because of their importance, in the present study only these two factors were included.

Neuroticism is a broad domain of negative affect, including the predispositions to experience anxiety, anger, depression, shame, and other distressing emotions (Costa, Terracciano, & McCrae, 2001). People who score high for neuroticism report being easily upset. In comparison to emotionally stable people, they experience negative affective states more often, being sometimes overwhelmed. They also express numerous concerns and worries, and frequently report reactions of being affected, shocked, embarrassed, insecure, nervous, anxious and sad (Borkenau & Ostendorf, 1993).

People with high extraversion are enthusiastic, energetic, confident, assertive and frequently feel joyful (Watson & Clark, 1997). Extravert people feel comfortable in groups and social situations, like the excitement and have a cheerful temper. On the other hand, introverts are reserved, independent and more than suffering from social anxiety, they have more the desire of being alone (Borkenau & Ostendorf, 1993).

Each higher order factor included in the FFM incorporate lower order facets. For neuroticism (in which a central core is the general tendency to experience negative affects) these facets are anxiety, hostility, depression, self-consciousness, impulsiveness, and vulnerability. The facets for extraversion are warmth, gregariousness, assertiveness, activity, excitement seeking, and positive emotion. Core features of extraversion are the disposition to engage in social activity (Watson, Clark, McIntyre, & Hamaker, 1992) and the tendency to experience positive affect (Watson & Clark, 1997). The present study does not include a lower-level analysis of personality facets but only neuroticism and extraversion as broad dimensions.

1.3.1.2 Personality traits and mental health

Although personality is not a fixed or static set of characteristics, but dynamic constructs that change and develop during life (Klein, Kotov, & Bufferd, 2011; Roberts, Walton, & Viechtbauer, 2006), personality traits are relative stable, especially as age increases (Roberts & DelVecchio, 2000; Watson & Humrichouse, 2006). Therefore, the study of personality traits and their relationship with psychopathology is a promising approach to the detection and prevention of mental disorders.

The Big Five traits have been an important focus for personality and psychopathology research and provide basic information about superordinate personality traits (Markon, et al., 2005). The dimensions included in the FFM could also work as risk factors or buffers for consecutive adjustment problems and may be relevant for interpersonal relationships, playing an important role in aspects such as relationship maintenance and satisfaction (John, et al., 2008).

A recent meta-analysis that included 175 studies published from 1980 to 2007 (Kotov, et al., 2010) investigated the associations between higher order personality traits in the Big Five model and psychopathology (anxiety, depressive, and substance use disorders). The results showed that neuroticism had the strongest correlation with the disorders assessed in the study (mean d = 1.65). It was also found that there was little specificity in the personality profiles

among different disorders (i.e. high neuroticism and low extraversion), showing that same personality traits are associated and contribute to different disorders. The authors suggested that the findings of the study are not new considering the high comorbidity among psychopathology, showing that same people meet criteria for different diagnoses and indicate that other specific factors should be taken into account to explain differences among the syndromes.

Other studies on psychopathology have shown that among the dimensions included in the FFM, neuroticism is the strongest and broadest predictor of psychopathology. High levels of this trait were associated with almost all clinical and personality disorders (Watson, Kotov, & Gamez, 2006). The authors also proposed that neuroticism should be considered a general predictor of the global level of psychological functioning and not necessarily a specific predictor of a particular disorder. Similarly, it has been suggested that neuroticism is an omnipresent personality trait within clinical populations (Widiger & Costa, 1994).

A meta-analysis that examined the association between personality traits and different symptoms of clinical disorders (including 33 studies) found that high neuroticism and low extraversion scores were associated with almost all types of clinical symptoms (Malouff, Thorsteinsson, & Schutte, 2005).

Personality traits and depressive disorders

Although neuroticism has been described as the strongest predictor in psychopathology among personality traits, it has been particularly related to mood and anxiety disorders. Watson, Gamez, and Simms (2005) reported the results of their analysis using data from a subsample of the National Comorbidity Survey (N = 5533). Neuroticism showed the highest correlation with psychopathology, and was more strongly associated with the diagnoses of any mood disorder (r = .30) and any anxiety disorder (r = .29). Comparably, Roselline and Brown (2011) found that higher neuroticism was also associated depressive disorder.

Watson et al. (2005) found that extraversion was also associated with several mental health conditions, even after controlling for neuroticism. Their results indicated a weak negative association between extraversion and MDD but a strong association with dysthymic disorder suggesting that extraversion is an important personality trait for some forms of mood disorders. Similar results were reported in a meta-analysis by Kotov et al. (2010), in which a medium relationship between low values of extraversion and MDD (d = -0.62), and a more consistent and stronger link to dysthymic disorder (d = -1.47) was found.

Longitudinal studies have suggested that neuroticism is a predictor of the onset of first lifetime major depressive episodes. Results from several studies have clearly and consistently shown an association between neuroticism and the onset of the first depressive episode, as has been shown in a large sample of same-sex twins in Sweden (Kendler, Gatz, Gardner, & Pedersen, 2006), in a representative sample of adults in Netherlands (De Graaf, Bijl, Ravelli, Smit, & Vollebergh, 2002) and in a population-based sample of male twins in the U.S. (Fanous, Neale, Aggen, & Kendler, 2007). Compared to neuroticism, the evidence of extraversion in the prediction of the onset of major depression is not fully consistent, with contradictory results in different studies (Fanous, et al., 2007; Kendler, et al., 2006; Kendler, Neale, Kessler, Heath, & Eaves, 1993).

Neuroticism and extraversion may also play a role in the course of depression after the onset of the disorder (Klein, et al., 2011). Many studies found that higher levels of neuroticism and lower extraversion predict a weaker response to treatment and a poorer course of depression (De Fruyt, Van Leeuwen, Bagby, Rolland, & Rouillon, 2006; Morris, Bylsma, & Rottenberg, 2009; Tang, et al., 2009). Furthermore, chronically depressed persons reported significantly higher levels of neuroticism and significantly lower levels of extraversion (Wiersma, et al. 2011).

Despite the fact that some items on the neuroticism scale are similar to depressive symptoms, this overlap can not fully explain the association between these two constructs (Tang, et al., 2009). Additionally, the assessment of personality traits usually has different time frames that depressive symptoms, which normally refer to more recent experiences (Klein, et al., 2011).

Personality traits and somatoform disorder

The relationship between personality traits and somatoform disorder or psychosomatic symptoms has not been as widely studied as for depressive and anxiety disorders. Nevertheless, some studies showed that there is a relationship between personality and somatization. A cohort study in a population sample of 6894 participants showed a significant association between neuroticism and reported somatic symptoms, with the association with symptoms of the psychosomatic type like nausea and fatigue being stronger than for infectious or allergic symptoms (Rosmalen, Neeleman, Gans, & de Jonge, 2007). Results from other studies indicated that there was a significant relationship between neuroticism and somatic symptoms or somatic disease in a random sample of Dutch adults (N = 7076).

Several studies have indicated a connection between neuroticism and the perception and report of somatic complaints, and several mechanisms for the relationship between neuroticism and health complaints have been theorized. A first mechanism suggests that people with high neuroticism are more likely to pay attention to psychical sensations and symptoms. Secondly, neuroticism may affect health more directly through physiological mechanism or lifestyle factors, independent of biased reporting and unmediated by psychiatric disorders. A third mechanism proposes that somatic and psychiatric illness may lead to increased neuroticism (Watson & Pennebaker, 1989). For example, health problems might entail feelings of distress, dissatisfaction and might be associated with a large number of somatic and psychosomatic symptoms and negative outcomes including psychiatric and somatic morbidity (Neeleman, Bijl, & Ormel, 2004; Vassend, Roysamb, & Nielsen, 2011; Watson & Pennebaker, 1989).

Although the relationship between extraversion and psychosomatic symptoms or somatoform disorder has not been widely reported, some studies have shown that higher extraversion is related to healthy behaviors, for example exercise engagement (Rhodes & Smith, 2006), lower risk of death (Wilson, et al., 2005), and might have a positive effect on the evolution of unexplained somatic symptoms (De Gucht, Fischler, & Heiser, 2004).

Personality traits and anxiety disorders

The meta-analysis from Kotov et al. (2010) found that neuroticism and extraversion were strongly related to all anxiety disorders, with the exception of the association between extraversion and specific phobia. Particularly, general anxiety disorder showed a strong association with neuroticism (d = 1.96) and with extraversion (d = -1.02). A study including 7588 twin adults (Khan, Jacobson, Gardner, Prescott, & Kendler, 2005) reported that from all the diagnoses included, the highest risk increase was for generalized anxiety disorder, in relationship to neuroticism, whereas extraversion was associated with a small increase risk for this diagnosis. Additionally, a recent longitudinal study including a sample of 2395 female twins in the U.S. examined causal pathways to anxiety and depressive symptoms and found that high levels of neuroticism influence the temporally stable component of anxiety symptoms and increase the chances of developing episodes of generalized anxiety disorder (Kendler & Gardner, 2011).

1.3.1.3 Personality traits and mental health in international students

As stated before, personality traits may play an important role as risk or protective factors for several mental disorders. As shown, neuroticism in particular has been linked to almost every psychiatric clinical disorder.

Neuroticism values during adolescence and early adulthood are higher than at older ages (Watson & Humrichouse, 2006). Considering this, students and international students might be at a particular risk for the development of mental disorders. Again, studies including personality traits in international students are very scarce, have been limited to only one particular nationality, or have explored only one psychiatric diagnose. The results from a study about readjustment of Japanese students studying abroad showed that neuroticism (measured before departure) was a significant predictor of psychiatric disturbance and depression symptoms after six months (Furukawa, 1997a; Furukawa & Shibayama, 1994). Neuroticism was also a predictor of psychological adjustment and depression in a sample of Chinese international students in Germany (Zhang, Mandl, & Wang, 2010), of acculturative stress in Turkish international students (Duru & Poyrazli, 2007), and was positively correlated to acculturative stress in international students studying in the U.S. (Poyrazli, et al., 2010). Importantly, none of these few studies included a control group, leaving open the question of whether there are any differences regarding personality traits among domestic and international students, and how these can influence mental health.

1.3.2 Social Support

1.3.2.1 Definition and general concepts

Recently, an impressive body of research regarding the construct of social support has been published. For a better comprehension of this concept and the associated theories and research in this field, it is important to attain a more accurate definition and differentiation between the concepts of social support, social networks and social integration.

Social networks involve the structure of social relationships, including their existence, quantity and type (Cohen, 1992). A social network has been also defined as “a unit of social structure composed of the individual’s social ties and the ties among them” (Gottlieb & Bergen, 2010). The analysis of social networks is quantitative and includes the assessment of

diverse properties of the network such as size, network density, dispersion and boundedness (Brissette, Cohen, & Seeman, 2000).

Social integration has been defined as a theoretical construct that refers to the extent to which an individual participates and is involved in her or his social network (Gottlieb & Bergen, 2010; Rodriguez & Cohen, 1998). Most frequently used indicators of social integration include marital status, number of relatives and friends (and how frequent the contact with them is), participation in group activities and other affiliations (Rodriguez & Cohen, 1998). Several approaches to measure social integration have been developed including the assessment of number of social roles (like spouse, parent, student or group member), the assessment of the frequency of activities in which individuals participate, and the perceived integration (Brissette, et al., 2000).

Cohen et al. defined social support as "the social resources that persons perceive to be available or that are actually provided to them by nonprofessionals in the context of both formal support groups and informal helping relationships" (Cohen, Gottlieb, & Underwood, 2000, p.4). It is a multidimensional construct that refers to the material and psychological resources that are available to individuals through their interpersonal relationships and the process in which these resources are used to cope with stressful events, meet their social needs and achieve their goals (Rodriguez & Cohen, 1998).

Social support is often divided into three subtypes: instrumental, informational and emotional support (House & Kahn, 1985). Instrumental support refers to the provision of aid, help and assistance of material and tangible needs, for example, assistance with financial problems, daily tasks like cooking, cleaning, getting to appointments or paying bills (Berkman, Glass, Brissette, & Seeman, 2000; Cohen, 2004). Informational support involves the provision of pertinent information which should help to cope with current difficulties normally taking the form of advice or counseling to handle problems, and in the service of particular needs (Berkman, et al., 2000; Cohen, 2004). Emotional support includes the expression of caring and empathy, as well as reassurance and trust. It is associated to the amount of love, sympathy, understanding, esteem or value available from others. Moreover emotional support gives the opportunity for the expression and venting of emotions (Cohen, 2004; Thoits, 1995). Emotional support is generally provided by a confidant or intimate other, being also possible that it could be provided by less intimate others under delimitated circumstances (Berkman, et al., 2000).

Another important aspect of social support is the distinction between received and perceived support. Perceived social support refers to "the belief or faith that support is available from network members, whereas actual support is its mobilization and expression" (Gottlieb & Bergen, 2010). The distinction between these two concepts is also important because received and perceived support are only weakly associated to one another (Barrera, 1986; Lakey, Orehek, Hain, & Van Vleet, 2010). This weak relation may be explained in part because the assessment of received social support normally refers to micro events, delimited by time frame, scope and conditions, whereas the assessment of perceived social support is based on generalizations of daily interactions and supportive exchanges over time (Hobfoll, 2009; Thoits, 2011). Furthermore, perceived social support has been shown to be effective in reducing distress, while received support often does not improve adjustment to stressful life experiences (Bolger, Zuckerman, & Kessler, 2000). Perceived support seems to increase the confidence to cope with stressors without necessarily turning to the network's resources (Gottlieb & Bergen, 2010). Some authors have suggested that differences between received and perceived social support may arise because the perception of social support might be more a personality characteristic, rather than an objective measure based on the support that has been received (Lakey & Cassady, 1990).

1.3.2.2 Social support and physical and mental health

Social support has been linked to physical and mental health outcomes. Studies have indicated that people with low levels of social support have higher mortality rates (Brummett, et al., 2001; Frasure-Smith, et al., 2000; Holt-Lunstad, Smith, & Layton, 2010), might present a higher risk for cardiovascular, neuroendocrine, and immune dysfunctions (Uchino, 2006), and display a poor adherence to medical treatments (DiMatteo, 2004). Furthermore, numerous studies have shown a relation between low social support and mental disorders such as MDD (Lakey & Cronin, 2008), suicidal ideation (Stravynski & Boyer, 2001), posttraumatic stress disorder (Brewin, Andrews, & Valentine, 2000) and psychological distress (Finch, Okun, Pool, & Ruehlman, 1999; Maulik, Eaton, & Bradshaw, 2010).

Two main models have been proposed to explain the mechanisms by which social support is related to physical and psychological health outcomes: the main effect model and the stress-buffering model (Cohen & Wills, 1985). These two models are not mutually exclusive but may explain how different aspects of social support such as social networks, social integration or perceived support influence mental and physical health (Kawachi & Berkman, 2001).

The main effect model

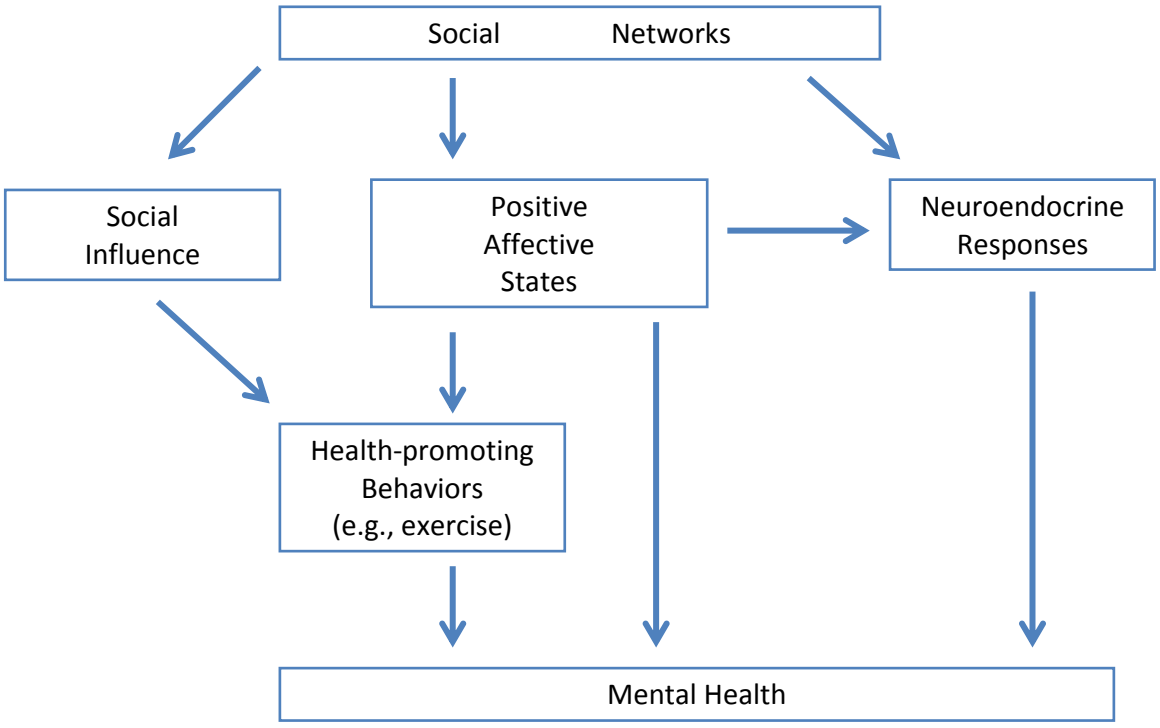
The main effect model proposes that social relationships are beneficial for an individual's health and well-being, regardless of the presence of stressful circumstances (Cohen, 2004; Rodriguez & Cohen, 1998). According to Cohen and Wills (1985), large social networks provide "regular positive experiences and a set of stable, socially rewarded roles in the community" (p. 311). Instances of social participation and social engagement include for example group recreation, getting together with friends, participation in occupational or social roles, or attending social functions (Berkman, et al., 2000). Social integration may produce positive psychological states that include the sense of stability in one's life situation, recognition of self-worth, as well as sense of purpose, belonging, and security (Cohen, 2004; Cohen & Wills, 1985). Meaningful social roles such as parental, occupational or community roles are defined and reinforced by social networks, therefore providing a sense of value, attachment, and a coherent and consistent sense of identity (Berkman, et al., 2000). All of these positive psychological states may beneficiate mental health by increasing the motivation for self-care and by modulating neuroendocrine responses to stress (Kawachi & Berkman, 2001). Social networks may also provide appropriate information that can not only influence health-related behaviors but also help to minimize stressful or risk situations (Cohen, et al., 2000). Individuals who are members in a social network can obtain normative guidance about behaviors like doing exercises, smoking or eating (Kawachi & Berkman, 2001). Social networks can influence such behaviors by mechanisms like social control or peer pressures (Cohen, 2004). They also prevent diseases by providing tangible and economic aid which can benefit an individual's health like providing food, housing, or by providing informal health care preventing that minor illnesses develop in more severe ones (Cohen, et al., 2000).

The main effect model of social support has been mostly related to structural support measures, particularly to social integration. However, several studies have also found a main effect of perceived support on mental disorders like major depression (Lakey & Cronin, 2008) and posttraumatic stress disorder (Brewin, et al., 2000). Perceived social support might also have a main effect on mental health as a result of positive affective and cognitive states related to the knowledge and security that "others" are going to be available in case of necessity (Cohen, et al., 2000).

A diagram that summarizes the main effect model of social support and its influence on mental heath is presented in Figure 2.

Figure 2

Main effect model of social ties and mental health



Note. In Kawachi, I. & Berkman, L. F. (2001). Social ties and mental health. *J Urban Health, 78*(3), 458-467.

Stress-buffering model

The stress-buffering model proposes that social support has beneficial effects protecting persons from the possible pathogenic influence that stressful events can produce (Cohen, 1992). The stress buffering theory can be considered an extension of the stress and coping theory proposed by Lazarus (Lazarus, 1966) and Lazarus and Folkman (Lazarus & Folkman, 1984). Social support can facilitate the coping with acute or chronic stressful experiences by providing emotional, informational, or instrumental resources (Cohen & Pressman, 2004).

The stress-buffering model also suggests two ways in which social support can act as a buffer against the negative effects of stressful events. In the first mechanism, social support may intervene between the stressful event or the expectation of its occurrence and the psychological and physiological stress reaction by attenuating or preventing the stress appraisal responses. The perception that others can help by providing necessary resources influences the perception of the potential harm of the situation by improving the perception of the abilities to cope with the demands imposed by the event. This would lead to perceive

negative events as less threatening and less potentially harmful (Cohen & Wills, 1985; Rodriguez & Cohen, 1998). The second proposed stress-support mechanism states that support may intervene between the experience of stress after the event and the onset of the psychological and psychical pathological outcome, due the reduction or elimination of the stress reaction (Rodriguez & Cohen, 1998).

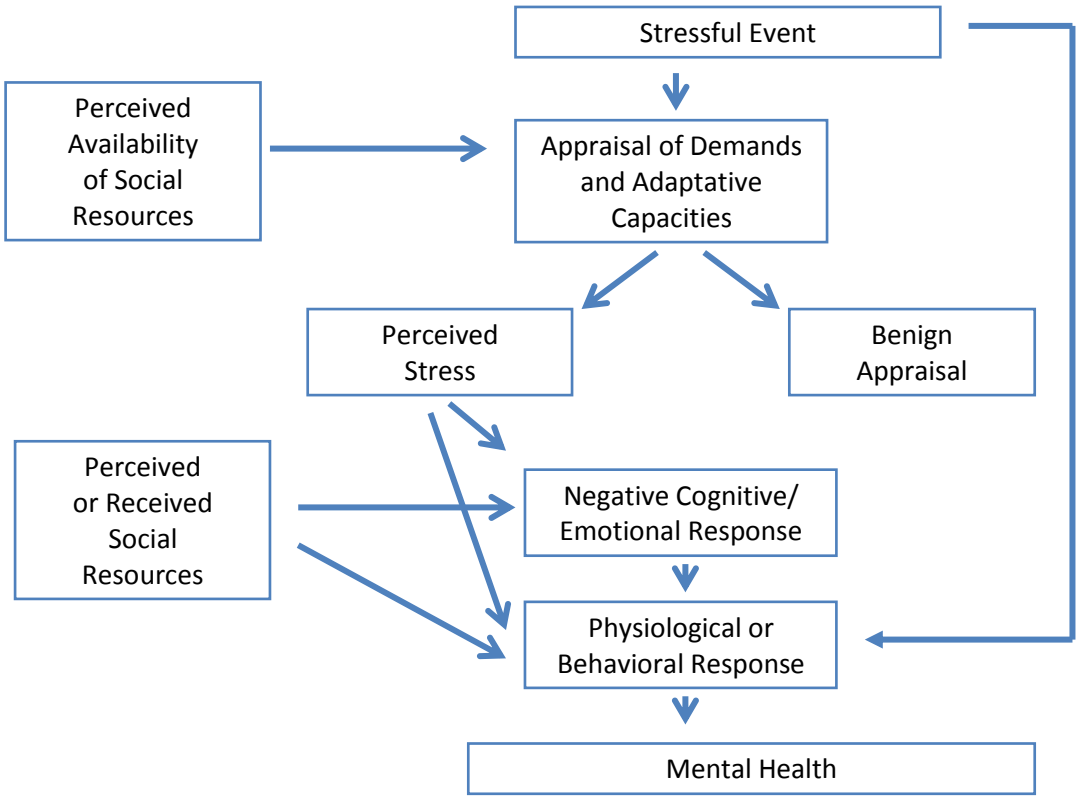
Thoits (2011) suggested that there are two broad mechanisms of supportive behaviors that are involved in the stress-buffering process. The first mechanism indicates that social support works to buffer the impacts of stress by providing active "coping assistance" and can include, for example, instrumental assistance, coping encouragement or information and advice and directly reduces the physical and psychological consequences of the stressor. The second mechanism, called emotional sustenance, includes demonstrations of caring, valuing, concern, understanding, acceptance of ventilation and validation of feelings and concerns as well as "being there". These behaviors influence the psychical and emotional state through social and psychological mechanisms such as providing sense of mattering, belonging and self-esteem indirectly rather than directly by changing the demands of the situation or the individual's physiological and affective reactions.

The stressor-resource matching hypothesis explains why perceived support operates as a stress buffer, suggesting that in order for the stress-buffering to occur, the resources that are perceived to be available should match the needs elicited by the stressful event (Cohen & McKay, 1984; Cohen & Wills, 1985). Another explanation for the buffer effect suggests that perceived social support can be viewed as stable individual differences that generate changes in cognition or self-concept and reflects an enduring personality characteristic (Sarason, Sarason, & Pierce, 1990).

A diagram that summarizes the stress-buffering model of social support and its influence on mental heath is presented in Figure 3.

Figure 3

Stress-buffering model of social ties and mental health



Note. In Kawachi, I. & Berkman, L. F. (2001). Social ties and mental health. *J Urban Health, 78*(3), 458-467.

Although the stress-buffering approach has dominated the social support research over the last decades, the results of that research has not provided consistent support of this model. On the other hand, the main effect model, less influential among the research community, has been consistently replicated in several studies (Burton, Stice, & Seeley, 2004; Lakey & Orehek, 2011; Maulik, et al., 2010). Therefore, many authors currently debate the necessity of critically reviewing the theories that try to explain the link between social support and health outcomes (Lakey & Orehek, 2011).

Social support and depressive disorders

The relationship between social support and depressive symptoms has been well documented. Studies in clinical and non-clinical samples including students showed that lower perceived social support was related to higher ratings of depressive symptomatology and increased the

risk of major depressive disorder (Clara, Cox, Enns, Murray, & Torgrudc, 2003; Hefner & Eisenberg, 2009; Romanov, Varjonen, Kaprio, & Koskenvuo, 2003; Strine, Chapman, Balluz, & Mokdad, 2008; Wade & Kendler, 2000). A longitudinal study in an inpatient clinical sample also indicated that patients who still meet the diagnostic criteria for depression at a follow-up reported significantly lower scores of social support (Nasser & Overholser, 2005). Poor perceived social support has been found to influence the medium-term prospective outcome of depressive symptoms in a sample of psychiatric patients (Leskela, et al., 2006). In a sample of inpatients with MDD, the patient's perception that a lack of social support posed a hindrance to their recovery was positively correlated to depression scores (Gladstone, Parker, Malhi, & Wilhelm, 2007). Moreover, a longitudinal study with a sample of 1057 pairs of opposite-sex twins showed that higher levels of global social support were strongly associated with reduced risk for subsequent depressive episodes, being the relationship between global social support and risk for depression significantly stronger in females than in males (Kendler, Myers, & Prescott, 2005).

Social Support and anxiety disorder

The relationship between social support and anxiety disorders has been much less studied. Results from a study using a large representative sample of U.S. adults showed that reported decreased levels of social and emotional support were inversely related to the number of days of anxiety symptoms. After adjusting for socio-demographic characteristics, participants who rarely or never receive social and emotional support were four times more likely to report anxiety symptoms compared to those who reported to always or usually receive social and emotional support (Strine, et al., 2008). Additionally, in a large sample of college students, Hefner and Eisenberg (2009) found that higher scores of social support were associated with a significantly lower risk of anxiety symptoms. Results from a study in a sample of African American adolescents indicated that parental support predicted less anxiety, both concurrently and prospectively (Zimmerman, Ramirez-Valles, Zapert, & Maton, 2000).

Even though these studies have shown a relationship between social support and anxiety, other results in a large adult sample did not show a significant association between social networks or social support and the presence of generalized anxiety disorder following a life event. However, increased social support from relatives was linked to lower risk of panic disorder when coming up against some specific life events (Maulik, et al., 2010).

Social support and somatoform disorder

There is only limited literature describing the relationship between social support and somatoform disorder with just some limited data of studies focused on particular symptoms of the disorder. Decreased levels of social and emotional support in a large community sample were found to be inversely related to the number of days of somatic complaints (Strine, et al., 2008). In older primary care attenders, perceived lack of social support predicted higher attendance and somatized symptoms (Sheehan, Bass, Briggs, & Jacoby, 2003). Lower levels of social support have also been associated to fibromyalgia syndrome (Shuster, McCormack, Riddell, & Toplak, 2009), chronic fatigue syndrome (Bhui, et al., 2011) and irritable bowel syndrome (Lackner, et al., 2010).

1.3.2.3 Social support and mental health in international students

There are some studies that have focused on the construct of social support among international students. Results have indicated that lower levels of social support were related to higher scores on anxiety and depression measures (Sumer, Poyrzli, & Grahame, 2008), higher levels of psychiatric symptoms (Furukawa, 1997b; Furukawa, et al., 1998) and higher levels of academic stressors and stress reactions (Misra, Cristb, & Buran, 2003). International students who were more satisfied with their social networks and also reported to be more socially connected, described less acculturative stress (Duru & Poyrazli, 2007; Yeh & Inose, 2003). Perceived and received support also showed a buffering effect on somatic complaints in a sample of Chinese students enrolled in different Japanese universities (Jou & Fukada, 1997). Additionally, one study about social support and mental health among college students at a public university in the U.S. which included a large random sample of university students, found that international students reported lower quality of social support, and were at higher risk of social isolation (Hefner & Eisenberg, 2009). However, almost none of these studies included a control group of domestic students.

1.3.3. Psychosocial stress and traumatic life events

1.3.3.1 Psychosocial stress

1.3.3.1.1 Approaches to the concept of stress

Although the term "stress" has been widely used in the literature, there are still disagreements regarding its meaning, which varies if stressful events, responses, or individual appraisal are emphasized as a central core (Cohen, Kessler, & Gordon, 1997). In spite of these differences, Cohen et al. (1997) suggested that all these approaches refer to a process in which "environmental demands tax or exceed the adaptive capacity of an organism, resulting in psychological and biological changes that may place persons at risk for disease" (p. 3).

It is possible to distinguish between three broad approaches of assessing the relationship between stress and disease emphasizing different aspects of this relationship: the environmental, psychological and the biological approach (Cohen, et al., 1997; Kopp, et al., 2011). However, other authors have also described integrated models of these three approaches (Cohen, et al., 1997).

Environmental approach

The focus of the environmental approach is the assessment of stressors. A major topic of research of this perspective has been the study of the role of stressful life events in the appearance of illness. Using this approach, a large body of research has shown a strong relationship between life events and both physical and mental disorders. For example, stressful life events have been related to cardiac disease (Rafanelli, et al., 2005; Saner, 2005); depression and anxiety (Friis, Wittchen, Pfister, & Lieb, 2002; Spinhoven, Elzinga, Hovens, et al., 2011).

Research of stressful life events has also focused its attention on the study of vulnerability factors associated to a higher or lower risk to develop a disease, with emphasis on genetic and psychological factors (Cohen, Janicki-Deverts, & Miller, 2007; Cohen, et al., 1997). Another topic of interest of this approach refers to the relationship between individual differences and the experiences of certain life events. For example, results from different studies have indicated that individuals with higher neuroticism scores tend to experience negative life events more often, whereas extraversion is associated with the experience of more positive

life events (Ludtke, Roberts, Trautwein, & Nagy, 2011; Magnus, Diener, Fujita, & Pavot, 1993). An increased risk for the occurrence of life events has also been associated to socially disadvantaged environments (e.g. ethnic minority, low-income or low-education) (Hammen, 2005).

Even though the study of stressful life events has focused on their negative effects and their relationship to physical and mental illness, current research has also suggested that such events may have positive outcomes. Severe stressful life events may lead to changes in the self-concept, to modifications in the relationships with social networks, and to personal growth and adjustment of life priorities (Updegraff & Taylor, 2000).

Psychological approach

The psychological approach to stress includes concepts involving the subjective reaction to stress such as "stress appraisal" and "emotional response". In this approach, a central aspect is the subjective evaluation of one's abilities to cope with the demands presented by certain events (Kopp, et al., 2011). In fact, events play an important role only in individuals who appraise them as a stressor, thus the perception of stress being a product of the interpretation of the signification of the events as well as the evaluation of own coping resources (Cohen, et al., 1997). Lazarus (1990) suggested a cognitive-relational view that implies a process and a constantly changing stress relationship ("transaction") between the person and the environment. Stress then reflects the conjunction of a person who has certain motives and beliefs with the environment, being stress a "post-appraisal" state. Taking these ideas into account, Lazarus (1990) suggested that psychological stress "depends on an appraisal by the person that the person-environment relationship at any given moment is one of harm, threat, or challenge" (p. 4). This process of evaluating both the event and own resources occurs not only at the onset of a stressor but also during the course of the event, which gives the possibility that an event that was first appraised as negative may be later considered benign and vice versa (Cohen, et al., 1997).

The biological approach

The biological approach defines stress in a response context and was developed basically from the work of Walter Cannon and Hans Selye. Cannon defined the term "homeostasis" by which acceptable ranges of several physiological variables (e.g. blood glucose or core tension) are maintained (Cannon, 1929). The author expanded the concept of homeostasis by

including psychosocial threats like emotional distress and described for the first time the acute changes and activation of the sympathoadrenal system, which he called the "fight or flight" responses (Goldstein & Kopin, 2007). On the other hand, Seyle popularized the concept of stress and defined it as "the nonspecific response of the body to any demand upon it" (Selye, 1974, p.151). The response pattern proposed by Seyle, i.e. the "General Adaptation Syndrome" (GAS), consists of three stages of coping with the stressor: the alarm reaction (which is comparable to the "fight or flight" response described by Cannon), the stage of resistance or adaptation, and, if the aversive stimulation persists, a stage of exhaustion in which the organism can no longer adapt to the stressor, leading to illness and death (Cohen, et al., 1997; Goldstein & Kopin, 2007; Krohne, 2001).

Integrated model

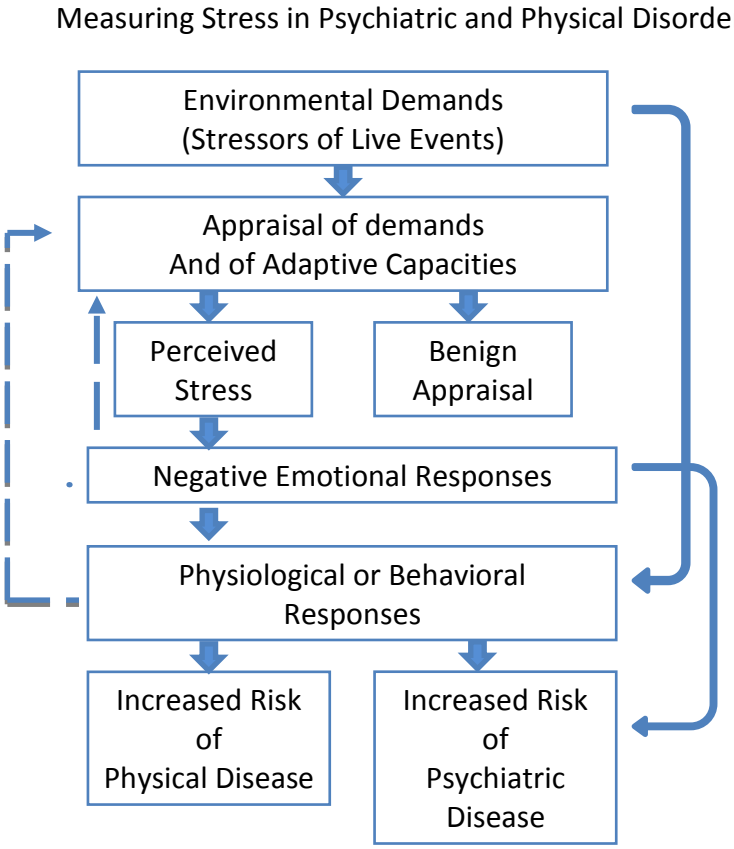
Models that integrate the three approaches previously described have also been proposed. For example, Cohen et al. (1997) presented an integrated model of these three approaches, depicted in Figure 4.

While facing demands of the environment, individuals evaluate their own coping resources and abilities to affront these demands. If as result of this evaluation these demands are considered a challenge or a threat and the coping resources are judged as inadequate, individuals perceive themselves under stress which may elicit negative emotional states. If these emotional states are extreme, they can directly lead to affective disorders or to physiological and behavioral responses that increase the risk for physical or psychiatric illness. The model also suggests that environmental demands can also be a risk for disease even though they do not generate perceptions of stress or negative emotional states.

The dashed lines in the Figure 4 suggest that emotional states can modify the appraisals of potential demands and physiological arousal may influence the appraisals and the emotional responses.

Figure 4

A heuristic model of stress designed to illustrate the potential integration of the environmental, psychological, and biological approaches to stress measurement



Note. In Cohen, S., Kessler, R. C., & Gordon, L. U. (1997). Strategies for measuring stress in studies of psychiatric and physical disorders. In S. Cohen, R. C. Kessler & L. U. Gorden (Eds.), *Measuring Stress: A Guide for Health and Social Scientists* (p. 3 -26). New York: Oxford University Press.

1.3.3.1.2 Measuring stress

A central practical difficulty about the concept of stress is how to measure it, especially when it is conceptualized as a process (Schwarzer & Schulz, 2002). Usually, a focal point in the studies of psychological stress refers to environmental events which are consensually considered as exceeding the coping resources or, on the other hand, to the individual responses like perceived stress or negative affect brought out by these events (Cohen, et al., 2007). Some instruments to measure stress and life events have added a subjective severity rating which allows to asses the individual's cognitive appraisals related to each event (Sarason, Johnson, & Siegel, 1978; Schwarzer & Schulz, 2002). The emphasis of the

subjective experience in the pathogenesis of stress is also supported by the fact that most of the measuring instruments are based on self-report questionnaires (Kopp, et al., 2011).

1.3.3.1.3 Forms of stress

It is possible to distinguish between different forms of stress depending on the quality (positive or negative stressors), intensity (micro or macro stress), duration (acute versus chronic stress) and the affected parties (individual versus collective impact) (Bodenmann & Gmelch, 2009). Other important distinctive criteria are if the stress situations are known or are experienced for the first time, if these situations are predictable or unpredictable, and controllable or uncontrollable (Kaluza & Vögele, 1999).

According to Bodenmann and Gmelch (2009), it is possible to distinguish between physical stressors (e.g. noise exposure, polluting emissions, etc), social stressors (e.g. conflict with neighbors or co-workers, worry about own children, etc), environmental stressors (e.g. small living space, isolation, etc), economic stressors (debts, financial worries, etc), job-related stressors (e.g. hectic work, too many responsibilities at the same time, etc) or monotony (e.g. monotone job). In this conceptualization, more importantly than the type of stressors, what is especially relevant here is the subjective appraisal of the stressors and the meaning that the stressor has for the individual.

Thoits (1995) proposes a different categorization. According to this author it is possible to distinguish three major forms of stressors: life events, chronic strains and daily hassles. Life events can be defined as acute changes that demand major behavioral readjustments in a relatively short period of time. Examples of live events are the birth of the first child or divorce. In distinction from life events, chronic strains refer to demands that are persistent or recurrent and which require readjustments over prolonged periods of time: living in poverty, chronic illness or marital problems, etc. Finally, hassles can be described as mini-events during the course of a day that require small adjustment like receiving unexpected visitors or being in a traffic jam. According to Thoits (1995) most of the studies about the association between stressors and mental health focused on the first two forms of stressors.

For the present study, stressors will be assessed mainly in form of life events as well as situations that may also be more persistent. Particularly, it is of interest to assess not only the occurrence of stressors but also how they are experienced.

1.3.3.2 Traumatic life events

Prevalence of traumatic life events has been shown to be relatively high among the general population (Galea, Nandi, & Vlahov, 2005; Norris, 1992). They can be considered a type of stressful experiences that lie on the extreme end of the severity continuum (Keyes, Hatzenbuehler, & Hasin, 2011). The nature and impact of these events, as well as the responses they generate, differ largely among individuals. Therefore, the comprehension of their relation with mental health is a complex issue. Traumatic events may be natural disasters like earthquakes or hurricanes, technological disasters like plane accidents or the release of radiation, war, criminal victimization such as domestic violence, sexual and nonsexual assault, among other examples (Schwarzer & Schulz, 2002).

According to the DSM-IV, life events qualify as a traumatic stressor when "the person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others" (American Psychological Association, 1994, p. 428). Furthermore, the subjective response to these events involves intense fear, helplessness, or horror (American Psychological Association, 1994). Concordantly with this definition, traumatic events may include violent assault, kidnapping, sexual abuse, torture, being a hostage, experiencing a disaster, violent automobile accidents, being diagnosed with a life-threatening illness or learning about the sudden and unexpected death of a close relative or friend.

1.3.3.3 Stress, Traumatic life events and physical and mental health

The effects of stress on the etiology and course of several physical and mental disorders are well documented. Endocrine responses such as a prolonged or repeated activation of the hypothalamic-pituitary-adrenocortical (HPA) axis and the sympathetic-adrenal-medullary system (SAM) elicited by stressors can interfere with the regulation of psychological systems resulting in an increased risk of physical and psychiatric disorders (Cohen, et al., 2007). Additionally, stress has been associated to eating disorder relapse following remission (Grilo, et al., 2012), sexual dysfunctions (Bodenmann, Ledermann, Blattner, & Galluzzo, 2006), depression [for example (Hammen, 2005; Leskela, et al., 2006)], psychosis (van Winkel, Stefanis, & Myin-Germeys, 2008), and generalized anxiety disorder (Gosselin & Laberge, 2003), among other disorders. Stressors and negative affect have also been linked to failure to

comply with medical indications which may naturally lead to more severe and longer-lasting illness (Cohen, et al., 1997).

On their part, traumatic life events can lead to several mental disturbances. Among these, post traumatic stress disorder is probably the most frequent psychological disorder that develops after traumatic events and disasters (Galea, et al., 2005). Importantly, the consequences of experiencing traumatic events are not limited to the period immediately following the event, but may have long-lasting effects on mental health. In fact, traumatic events may play an important role in individual's lives, shaping biographies and affecting the physical and mental health to a large extend (Schwarzer & Schulz, 2002). As an example, long-lasting effects have been found in survivors of the holocaust (Favaro, Rodella, Colombo, & Santonastaso, 1999; Landau & Litwin, 2000). Similarly, childhood trauma has been linked to different psychiatric disturbances in adulthood, including psychotic symptoms (Galletly, Van Hooff, & McFarlane, 2011), severe mood disorders (Lu, Mueser, Rosenberg, & Jankowski, 2008), eating disorders (Brewerton, 2007), borderline personality disorder (Ball & Links, 2009) and others (Subic-Wrana, et al., 2011; Zlotnick, et al., 2008). As a further example, in a large community sample in Chile, individuals exposed to potentially traumatic events were more likely to meet criteria for several psychiatric disorders such as dysthymic disorder, panic disorder, agoraphobia, alcohol or substance use disorder, antisocial personality disorder as well as the diagnosis of any psychiatric disorder, than those without exposure to potentially traumatic events (Zlotnick, et al., 2008).

Stress, traumatic life events and depressive disorders

There is an extensive literature showing an empirical link between stress and depression. The severity of adverse life events has been shown to influence the medium-term outcome of psychiatric patients with the diagnosis of MDD (Leskela, et al., 2006). Studies have shown that patients reported higher levels of stressors preceding the onset of major depressive episodes compared to controls in community samples (Hammen, 2005; Mazure, 1998). Kendler et al., using a large sample of female twins in a longitudinal study of genetic and environmental risk factors for psychiatric disorders, found that stressful life events had a considerable causal relationship with the onset of major depressive episodes (Kendler, Karkowski, & Prescott, 1999). Furthermore, in a large national sample of adults (N = 32744), the prevalence of MDD was positively linked with the number of stressful events (Slopen, Williams, Fitzmaurice, & Gilman, 2011). Results of studies suggest that it is common that stressful life events precede episodes of major depression. However, most of the people who

have experienced a stressful life event do not develop a depressive disorder (Hammen, 2005), which also suggests that protective factors might modulate the impact of negative life events. Positive and negative events have been found to be significant predictors of the course of depressive symptoms in remitted patients. Whereas negative life events predicted the exacerbation of depressive symptoms, positive life events were related to a reduction of symptoms (Spinhoven, Elzinga, Roelofs, et al., 2011).

Traumatic life experiences have also been being related to depressive disorders and depressive symptomatology after the terrorist attacks in New York City (Galea, et al., 2002), after childhood and adult trauma in a sample of low-income African American primary care and gynecology patients (Gillespie, et al., 2009), in victims of fire and motor vehicle accidents (Maes, Mylle, Delmeire, & Altamura, 2000), or after war experienced by civilians (Neria, Besser, Kiper, & Westphal, 2010) and soldiers (Lapierre, Schwegler, & LaBauve, 2007). For example, a study including a large sample of adult health maintenance members in a health centre showed that the number of adverse childhood experiences such as psychical or sexual abuse had a graded relationship to lifetime and recent depressive disorders, suggesting that such experiences may be considered a risk factor for depressive disorders even after long periods of time (Chapman, et al., 2004).

Stress, traumatic life events and somatoform disorder

It has been suggested that as appraised stress often involves physiological arousal, individuals under stress may pay more attention to their internal physical states. Stress could also facilitate the labeling of normal sensations as symptoms by activating schemas of prior experiences in which stress was connected to symptoms, or because physical sensations caused by stress are attributed to a disease and not to the stressor (Cohen, et al., 1997).

In a sample of patients attending to primary care, negative life events were significant predictors of medically unexplained symptoms and of the course of somatoform disorder (Steinbrecher & Hiller, 2011). It has also been found that stress and stressful life events play an important role in both the development and maintenance of functional abdominal pain in childhood (Boey & Goh, 2001; Schulte, Petermann, & Noeker, 2010). Furthermore, childhood trauma has been found to have a direct effect on somatic preoccupations in patients of an internal medicine clinic (Sansone, Wiederman, & Sansone, 2001).

Fewer studies have studied the relationship between somatoform disorders and traumatic events. After a natural disaster in Puerto Rico, a higher prevalence of medically unexplained

physical symptoms was found, especially for gastrointestinal (abdominal pain, vomiting and nausea) and pseudoneurological symptoms like amnesia, paralysis, fainting or unusual spells or double vision (Escobar, Canino, Rubio-Stipec, & Bravo, 1992). However, other studies have not found a significant association between somatoform symptoms after natural disaster (North, Kawasaki, Spitznagel, & Hong, 2004). Finally, a study including Gulf War veterans showed a significant relationship between traumatic events during war, especially handling dead bodies, and somatoform disorder (Labbate, Cardena, Dimitreva, Roy, & Engel, 1998).

Stress, traumatic life events and anxiety disorders

Several studies have shown that there is a relationship between stress or stressful life events and anxiety disorders. According to the diagnoses assessed in the present study (and the corresponding assessment instruments), the review of the literature will be focused on the diagnoses of generalized anxiety disorder and anxiety disorder not otherwise specified.

The presence of stressful life events as well as chronic stress-inducing situations like family conflicts have been studied as etiological factors and associated with an increased risk for generalized anxiety disorder [please see (Gosselin & Laberge, 2003) for a review].

In a study including a large community sample, individuals with the diagnosis of generalized anxiety disorder or MDD were more likely to experience stressful life events than individuals without these mental disorders (Newman & Bland, 1994). Furthermore, people who reported experiences with life threatening events and specific stressful life events such as death of a family member had a higher prevalence of generalized anxiety disorder (Muhsen, Lipsitz, Garty-Sandalon, Gross, & Green, 2008). Persons with generalized anxiety disorder also reported a greater number of minor stressors than controls in a sample of low-income primary care patients (Brantley, Mehan, Ames, & Jones, 1999). In children, higher levels of psychosocial stressors and life adversity have also been associated with the diagnosis of generalized anxiety disorder (Nordahl, Wells, Olsson, & Bjerkeset, 2010). Other studies have examined the relationship between traumatic life events and generalized anxiety disorder showing that exposure to trauma is associated with this disorder (Brawman-Mintzer, Monnier, Wolitzky, & Falsetti, 2005; Roemer, Molina, Litz, & Borkovec, 1996). For example, civilians exposed to war trauma in Israel showed higher prevalence rates of generalized anxiety disorder during war than after ceasefire (Neria, et al., 2010). A study screening for general anxiety disorder among primary care patients after the terrorist attacks of September 11 found that individuals with generalized anxiety disorder were more likely to report having a loved

one at the disaster site, knowing someone who was killed, or knowing someone involved in the rescue or recovery. Moreover, compared to individuals without generalized anxiety disorder, this group was more likely to have been exposed to trauma including various types of assault, illness, injury or death, transportation accidents and exposure to a toxic substance (Ghafoori, et al., 2009).

1.3.3.4 Stress and traumatic life events and mental health in international students

As stated before in section 1.1.4, many studies have indicated that international students face several challenges, problems and stressors while adapting to a new country and cultural environment with a more limited access to resources and less social support than domestic students (Pedersen, 1991). Several problems and stressors that this group may face have been described, including learning role behaviors of the new culture (Pedersen, 1991), adjustment problems involving general living, academic, socio-cultural and psychological adjustments (Tseng & Newton, 2002). Furthermore, it has been reported that international students face several challenges such as problems with housing, acquisition of language skills and communication, racial discrimination, homesickness, culture shock, loss of social support systems, financing, figuring out the academic system, among others (Isserstedt & Kandulla, 2010; Sandhu, 1994; Tseng & Newton, 2002). Similarly, stress from adapting to a new culture and cultural adjustment, interpersonal stress and academic concerns predicted life stress among international students in the U.S. (Misra, et al., 2003).

After searching for studies about traumatic life events or trauma exposure in international students, it seems that there is no research on this topic, and therefore, no data available about exposure to traumatic life events and their relationship to mental health in this specific group.

1.3.4 Resilience

1.3.4.1. Definitions and general concepts

Many definitions of resilience have been proposed and there is still a lack of consensus about the concept (Herrman, et al., 2011; Luthar, Cicchetti, & Becker, 2000). The term resilience is used to make reference to the phenomenon that some individuals have a relatively good psychological outcome even though they have faced risk experiences after which serious psychological repercussions would be expected (Rutter, 1999, 2006). From the perspective of

developmental psychology, resilience has been discussed in terms of protective factors that promote positive outcomes and personality characteristics among children exposed to adversity (Bonanno, 2004). In adults resilience may be understood as the ability to keep relatively stable and healthy levels of psychological and physical functioning after being exposed to adversity (e.g. death of a close one or a violent situation) (Bonanno, 2004). From a longitudinal perspective, the concept of resilience has also been defined as bouncing back after adversity (Netuveli, Wiggins, Montgomery, Hildon, & Blane, 2008).

However, the conceptualization of resilience differs regarding if it is seen as a personal trait, a dynamic process of positive adaptation after the exposure to significant adversity, or as a successful outcome. Because the present study center on resilience as a personality characteristic, more attention will be drawn to this approach.

The focus of the research on resilience conceptualized as part of personality is to identify personal characteristics that related to good outcomes despite adversity. Some of these characteristics include commitment, optimism, tranquility and humor in the face of adversity, capability to tolerate negative affect and work toward meaningful goals (Connor & Zhang, 2006; Fredrickson, Tugade, Waugh, & Larkin, 2003). Resilient individuals have also been characterized by having positive emotionality (Block & Kremen, 1996) and by apparently engaging more strongly in positive events and exhibiting greater positive mood savoring of daily positive events (Ong, Bergeman, & Chow, 2012). It has been also suggested that resilient personalities are characterized by a strong, well-differentiated, and integrated sense of self, positive future orientation, control of negative behavior and emotion, hardiness, and by having interpersonal skills which help to maintain relationships that can give assistance when facing adversity (Skodol, 2012). Resilience as a personal attribute has been more examined in the adult literature than in the developmental literature. From this perspective, resilience is not viewed as a static individual trait but emerging from many processes and interactions that include not only the individual but also close relationships and social support (Masten & Wright, 2012). Because resilience is not viewed as a single quality it has been suggested that the fact that individuals who are resilient to some situations does not mean that they are to all of them. Moreover, individuals may also be resilient to some kinds of outcomes but not to others and not necessarily every time (Rutter, 2006; Wolff, 1995).

The concept of resilience focuses, unlike most of research that assesses risk factors for diverse diseases and psychopathology, on strengths rather than deficits and on understanding healthy development despite of risk exposure (Fergus & Zimmerman, 2005). Furthermore, it has been

described that adversity can provoke positive psychological changes and that some individuals may experienced growth following extreme experiences (Joseph & Linley, 2006). Consequently, resilience can be also considered a central focus of treatments of mental disorders because it focuses on strengths that are already present and not on deficits or absent determinants (Connor & Zhang, 2006). However, research in psychiatry, psychopathology and psychology has centered its attention for many years on disease and pathology using a disease-focused medical model while neglecting other human experiences (Campbell-Sills, Cohan, & Stein, 2006; Seligman & Csikszentmihalyi, 2000). Several determinants on which resilience is grounded have been described such as biological mechanisms (Charney, 2004; Morgan, et al., 2002), genetic determinants (Caspi, et al., 2003; Kim-Cohen, Moffitt, Caspi, & Taylor, 2004), temperament (Werner, 1992), psychological (Campbell-Sills, et al., 2006; Tugade & Fredrickson, 2004) and environmental factors (Brewin, et al., 2000; Haskett, Nears, Ward, & McPherson, 2006).

The focus of research on resilience, and especially during initial research on this concept, has been the study of children or adolescents who have been exposed to adversity (e.g. poverty, deprivation and war) and how despite of adversity, some of them showed good outcomes. Consequently, most of the research has been conducted in the field of developmental psychology and fewer studies have examined the concept of resilience in adulthood. Therefore, there is little research about how resilience operates in these populations (Campbell-Sills, et al., 2006). Additionally, most of the studies examining the process of adaptation in adulthood have been conducted including only treatment-seeking populations (Bonanno, 2004).

The study of resilient children has led to the perception, especially during the early research, that resilient children were “invulnerable” or “invincible” (Masten, 2001). Similarly, theorists have also understood resilience as something rare associated to exceptionally healthy individuals (Bonanno, 2004). However, more recently it has been pointed out that the capacity of resilience (for example after interpersonal loss and traumatic events) is not rare but relatively common, and represents healthy adjustment. In fact, many people manage to bear the temporary disturbances caused by loss or traumatic events relatively well (Bonanno, 2004). Comparably, it has been suggested that resilience is common among children and adolescents exposed to adversity (Masten, 2001).

Bonanno (2004) suggested that resilience is not the same as recovery in his article on resilience to loss and trauma. While recovery implies the idea that there is a trajectory of

normal functioning that changes to threshold and subthreshold psychopathology and then returns to prior levels, the term resilience indicates the capability to maintain a stable equilibrium. Furthermore, resilience does not simply mean the absence of psychopathology, as resilient individuals may also experience temporary alterations in normal functioning. However, they have a relatively healthy functioning across time.

1.3.4.2 Resilience and mental health

As has been shown, the concept of resilience is closely linked to positive physical and psychological outcomes and to the characteristics that promote them. However, a problem involving the construct of resilience refers to its operationalization and assessment, as it is frequently assessed not directly but through several indirect indicators (Luthar, et al., 2000).

In the present study and according to the measurement instrument used to assess resilience, the construct was defined as the ability to successfully use internal and external resources for the accomplishment of developmental tasks (Schumacher, 2005), and as a positive personality characteristic that improves individual adaptation (Wagnild & Young, 1993). Hence, in the following section, research examining the relationship between resilience and several outcomes (e.g. depression, anxiety) is presented including mostly studies that conceptualize resilience as a personal characteristic and not, for example, as an outcome.

Resilience and depressive disorders

Among the Russian immigrant population in Israel individuals who had lower resilience scores were at higher risk of being depressed (Aroian & Norris, 2000). Findings from studies conducted in samples of older adults have shown that there is an association between late-life depression and resilience (Mehta, et al., 2008). Resilience has also been negatively associated with depressive symptoms and/or depressive disorders in a national sample of nurses working in an intensive care unit (Mealer, et al., 2012), in a representative sample of German male adults (Beutel, Glaesmer, Wiltink, Marian, & Brahler, 2010), in a large sample of college students (Mak, Ng, & Wong, 2011) and adolescents (Hjemdal, Aune, Reinfjell, Stiles, & Friborg, 2007; Hjemdal, Vogel, Solem, Hagen, & Stiles, 2011). In a sample of urban adults with history of childhood abuse or trauma (N = 792), resilience was found to have a significant main effect on depression severity as well as in interaction with other trauma exposures (Wingo, et al., 2010). Furthermore, it has been shown that higher resilience

predicted better treatment response in a sample of depressed patients (Min, Lee, Lee, Lee, & Chae, 2012).

Resilience and somatoform disorder

There are only few studies that have examined the relationship between resilience and somatoform disorders. Results from a longitudinal study including a sample of patients at risk for the development of secondary somatoform vertigo and dizziness (SVD) showed that patients with higher resilience scores were less likely to have SVD at follow-up (Tschan, et al., 2011). It has also been suggested that the prognosis of a somatoform disorder is influenced by a variety of factors including intrinsic strengths and resilience (Williams, Harding, & Fallon, 2009).

Resilience and anxiety

Because the concept of resilience is associated to exposure to stress and adversity, most of the research examining the relationship between resilience and mental disorders has included mostly the diagnosis (or at least symptoms) of posttraumatic stress disorder rather than other disorders (e.g. generalized anxiety disorder). The presence of high resilience in nurses working in an intensive care unit was significantly associated with a lower prevalence of posttraumatic stress disorder, symptoms of anxiety or depression, and burnout syndrome (Mealer, et al., 2012). In a representative sample of German male adults ($N = 2144$), resilience was negatively correlated with generalized anxiety disorder (Beutel, et al., 2010). Results from a study in a German general practice ($N = 242$) indicated that patients with higher anxiety scores reported lower resilience (Runkewitz, Kirchmann, & Strauss, 2006).

1.3.4.3 Resilience and mental health in international students

It has been suggested that resilience as a trait-like personal competence facilitates the capacity to achieve adaptive short-term goals, to avoid maladaptive outcomes and to rise above the difficulties they may face in the local environment among immigrant populations (González-Castro & Murray, 2012). However, only few studies have investigated the concept of resilience in international students, although it is expected that this population might face considerable difficulties and stress while adjusting to a new country. A study conducted at a university in the U.S. including a sample of 207 international graduate students explored the

relationship between resilience characteristics and adjustment. The Results indicated that there was a negative correlation between resilience characteristics and adjustment problem areas suggesting that international students with higher levels of resilience tended to have fewer adjustment problems. Furthermore, resilience characteristics were significant predictors of adjustment for international students (Wang, 2009).

2 Aims of the study, research questions and hypotheses

The general objective of the present study was to examine the mental health of international university students and the risk and protective factors associated with the development and maintenance of mental disorders and symptom severity in this population.

Therefore, the first aim was to determine the prevalence rates and severity of symptoms of common mental disorders (i.e. MDD, other depressive disorder, somatoform disorder and other anxiety disorder) in the population of international students. A sample of German students was also included in order to compare and examine whether these two populations differ in the prevalence rates and severity of symptoms. Additionally, relevant information related to mental disorders such as gender distribution, comorbidity between mental disorders and current treatment (e.g. psychological or psychiatric treatment, medication intake) was explored and compared between the two groups.

The second aim of the study was to examine the role of psychological variables (i.e. personality traits -neuroticism, extraversion-, social support, stress, resilience and traumatic life events) as well as demographic characteristics (i.e. status of international or German student, gender and age) as potential predictors of the development of mental disorders and severity of symptoms. The study examined whether international and German students differ in the scores of these factors, and how these potential predictors influence the appearance of mental disorders (as protective or risk factors) and their severity in these two groups.

As has been described, psychological variables (i.e. neuroticism, extraversion, social support and resilience) have been assessed to examine their role in predicting mental disorders and severity of symptoms. These constitute latent variables that can not be measured directly but inferred from observed variables (e.g. items from a measurement instrument). Therefore, and to assure that comparisons between international and German students on these psychological variables are valid and meaningful, the third main aim of the study was to test the factorial validity of measurement instruments and the measurement invariance across groups.

Finally, the forth aim of the study was to explore the change of severity of symptoms over time and the predictors involved in this process. Therefore, a follow-up examination was conducted to investigate which variables (i.e. psychological variables, symptom severity, actual stress levels and positive and negative life changes) predict the course of depressive, somatic and anxiety symptoms over time, and whether there is (or is not) a difference between international and German students.

In summary, the study focuses on answering the following research questions:

1. What are the prevalence rates of MDD, other depressive disorder, somatoform disorder and other anxiety disorder among international and German students?
2. Which is the severity of depressive, somatic and anxiety symptoms among international and German students?
3. Do international and German students differ in the prevalence rates of the assessed mental disorders and in scores of symptom severity?
4. Do the prevalence rates between males and females in each sample differ?
5. Do international and German students who meet diagnostic criteria for any mental disorder differ in their need of psychological or psychiatric assistance as well as in the treatment they are receiving?
6. Do measurement instruments for the assessment of latent predictors operate equivalently across samples so that requirements for measurement invariance are met?
7. Do international and German students differ in the scores of potential predictors associated to mental disorders and symptom severity?
8. Which are significant predictors of the mental disorders and of symptom severity at T1?
9. Do international and German students differ in the effect of predictors on mental disorders and symptom severity?
10. Do specific variables associated with the status of international student predict the diagnoses of mental disorders and severity of symptoms?
11. Which are significant predictors of the course of depressive, somatic and anxiety symptoms over time?
12. Do international and German students differ in the effect of predictors on the course of symptoms over time?

Based on the literature reviewed in the theoretical background section, the veracity of the following hypothesis will be tested:

1. It is expected that international students show higher prevalence rates of MDD, other depressive disorder, somatoform disorder and other anxiety disorder than German students.
2. It is expected that international students have more severe depressive, somatic and anxiety symptoms than German students.
3. It is expected that international and German students differ significantly in social support scores, showing international students lower scores than German students.
4. It is expected that international students report higher stress levels than German students.
5. It is expected that the status of international student is a significant predictor of MDD, somatoform disorder and other anxiety disorder as well as of the severity of depressive, somatic and anxiety symptoms.
6. It is expected that neuroticism, social support, stress, resilience and traumatic life events are significant predictors of MDD, somatoform disorder and other anxiety disorder as well as of severity of depressive, somatic and anxiety symptoms.
    a) Students who have higher neuroticism and stress levels and have experienced more traumatic life events are at higher risk for mental disorders and higher symptom severity.
    b) Students who have lower social support and resilience scores are at higher risk for mental disorders and higher symptom severity.
7. It is hypothesized that stress at the follow-up examination and positive and negative life experiences between the first and second assessment are significant predictors of the course of depressive, somatic and anxiety symptoms.
    a) Higher levels of stress at the follow-up examination and more negative life experiences between the first and second assessment are predictors of higher symptom severity at the follow up-examination.
    b) Less positives life experiences between the first and second assessment are associated with higher symptom severity at the follow up-examination.

3 Methods

3.1 Sample selection

To recruit international and German students, two Universities were contacted: the Eberhard Karls Universität Tübingen, through its Central Administration - Research, Strategy and Legal Affairs Department, and the Ruprecht-Karls-Universität Heidelberg, through its International Relations Office. The Eberhard Karls Universität Tübingen allowed contacting both, international and German students enrolled. The Ruprecht-Karls-Universität Heidelberg allowed contacting only international students enrolled at this university.

Sample of international students

The inclusion criterion for international students was being full-time undergraduate or postgraduate international student enrolled during the winter term 2008/2009. Students from all nationalities and faculties were contacted.

Exclusion criteria were:

1) Being part of an exchange program (e.g. Erasmus). The logic behind this criterion was based on the fact that the situation of exchange students differs significantly from full-time international students who usually stay for a longer time in Germany, while exchange students normally stay for only one or two semesters. Furthermore, exchange students usually receive intensive support from the university in form of special courses or activities, priority in the distribution of dormitory rooms or apartments, for example.

2) Having earned a German Abitur either in Germany or at a German school in another country (Bildungsinländer). Although these students may have an international nationality, they usually have undergone several years of studies in Germany (e.g. elementary school, gymnasium) or, in few cases, were in an international country but in a German education system.

Sample of German Students

The inclusion criterion was being full-time undergraduate and postgraduate German student enrolled during the winter term 2008/2009. Students from all faculties were included as well

as Bildungsinländer students. As noted previously, German students were recruited only from the Eberhard Karls Universität Tübingen.

3.2 Survey description

An online-survey was devolved for the data collection using the software EFS survey from Questback ®. Online surveys have several advantages for research studies, such as allowing to contact a large number of participants in a short period of time and saving time and costs at all steps of the process (Wright, 2005). Furthermore, collected data can easily be exported to statistical software packages, avoiding mistakes in data entry. The fact that the samples were composed by students who usually have internet access and the possibility to contact the participants via the university email were also strong arguments for choosing an online format. Additionally, Questback ® software provides a quality correction program that can be used to recognize (and later to exclude) participants who simply "clicked through", for example, in order to take part in a raffle or to get an overview of the study.

For the first data collection (hereafter defined as "T1") the survey developed for the sample of international students included questions to collect demographic data and other relevant information about their current situation (e.g. housing, language knowledge), as well as measurement instruments for the assessment of mental disorders and risk and protective factors (see Appendix A). Two versions of the survey were developed: one in German and another in English. Students could choose the language in which they preferred to answer the questionnaire at the beginning of the survey.

For the sample of German students a similar version of the online survey was developed including the same measurement instruments but also relevant questions for this specific group. In this case the language of the survey was German.

The follow-up assessment (hereafter defined as "T2") also consisted in an online survey created with the same software used for T1. Once again, the survey was in both languages, English and German.

3.3 Contact of participants and data collection

For the cross-sectional study (T1), an email was sent to students inviting them to participate in the survey. For students of the Eberhard Karls Universität Tübingen, the email was sent on behalf of the Institute of Psychology and the Office of Student Services. At the Ruprecht-Karls-Universität Heidelberg, the e-mail was sent on behalf of the Institute of Psychology of the University of Tübingen and the International Relations Office of the Ruprecht-Karls-Universität Heidelberg. The e-mail included an URL link to the online survey and a brief description of the study. It was specified that the participation in the study was voluntary and anonymous and that all the information obtained would be used for research purposes only. Also, information regarding the duration of the survey and the possibility to participate in a raffle once it was completed was included.

Once participants of both samples entered the link to the survey they were again informed about the aim of the study, data protection, and were provided with general instructions about how to fill the survey. All of the students were asked to enter a personal code for identification purposes at follow-up.

After having answered the survey, participants were invited to take part in a raffle of three prizes (200, 120 and 80 Euro) to increase motivation to participate in the study. Students could take part in this raffle by sending a separate e-mail with the subject “raffle” to assure that the e-mail address will not be saved along with the collected data. Students were also invited to contact the researcher by e-mail in case of further questions or comments about the study. Contact information about counseling services at the University was also provided.

For this first part of the study (T1) data was collected between January and March 2009. A total of 6.117 international students (Tübingen 1.687, Heidelberg 4.430) and 19.776 German students were contacted. The response rate was 13.06 % for the sample of international students (total = 799) and 14.1% for the sample of German students (total = 2.789).

Of the total of international students who answered the survey at T1, 78 were excluded because they answered the survey more than once (n = 14), based on the quality correction program (n = 3), or were in fact exchange students (n = 61). The final sample for the analysis then consisted of 721 international students. From this final sample, 28.8% were enrolled at the University of Tübingen (n = 208) and 71.2% at the Ruprecht-Karls-Universität Heidelberg (n = 513).

Of the total of German students who answered the survey at T1, 127 were excluded because they completed the survey more than once (n = 91), were not enrolled at the University of Tübingen (n = 25) or according to the quality correction program (n = 11). Therefore, the final sample used for the analysis consisted of 2662 German students.

During June 2010 a second email was sent to international and German students to invite them to participate in a follow-up assessment (T2). Only students who took part in the raffle at T1 (and therefore information about their email addresses was available) were contacted. This email was sent to a total of 2477 students with general information about the second part of the study, including an URL link to the online survey, and explaining that the participation was voluntary as well as anonymous. The response rate for this follow-up was 29%.

Among international students, 112 answered the follow-up survey and were included in the analysis at T2. Among German students, 488 answered the follow-up survey and were included in the analysis at T2.

Participants had the possibility to choose between German and English language. As for T1, students had the opportunity to participate in a raffle with the same prizes by sending a separate email once the survey was completed.

3.4 Demographic description

3.4.1 International students

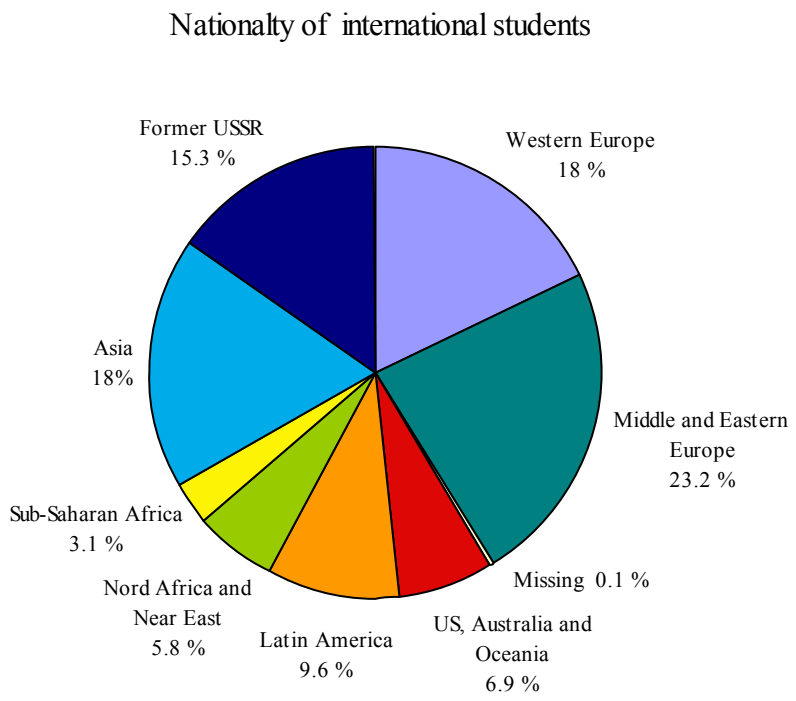
3.4.1.1. Cross sectional study (T1)

The average age of international students of the final sample was M = 25.92 (SD = 4.73, Range 18 - 60) years. The gender distribution revealed that 68.2% of the students of this sample were female. Most of international students were single without partner (n = 304; 42.2%) or with a fest partner (n = 283; 39.3%). Additionally, 16.8% (n = 121) were married and only a small number were divorced (n = 11) or widowed (n = 2), and 8.9% of international students had at least one child (see Table 1).

To facilitate the analysis, international students were divided into eight groups according to their nationality. As the Figure 5 shows, most of international students came from Middle or Eastern Europe (23.2%), from Western Europe (18%) or Asia (18%).

Figure 5

Distribution of group of nationalities in the sample of international students



With regard to the field of studies distribution, most of the international students were studying German language or literature (14.7%), medicine or dentistry (13.2%), social and behavioral sciences (8.5%) or biology (8.5%). Furthermore, 20.5% of them studied towards a bachelor degree, 11.4% towards the Diplom degree, 16.6% towards a magister degree, 14% towards a master degree, 13.2% towards a state examination (Staatsexamen), 19% towards a doctored degree and 5.3% towards other degrees.

International students were also asked to rate their knowledge of the German language before coming to Germany and currently (T1). Only 34% of students described their German knowledge as very good or good before arriving in Germany, while at T1 this percentage raised to 75.3%.

3.4.1.2 Follow-up assessment (T2)

Of the international students who took part in the follow-up assessment, 71.4% were female. On average, students from this sample were *M* = 26.22 years old (*SD* = 3.99, range 20 - 41). According to the given information, 86.6% of international students who participated at T2 were still studying at the university, 12.5% had already completed their studies and 0.9% were not enrolled due to other reasons.

3.4.2 German students

3.4.2.1 Cross sectional study (T1)

The gender distribution of this sample shows that 66.7% of the students were female and that the average age was *M* = 23.87 (*SD* = 4.073, Range 18 - 68) years. Over half of the German students were single with a partner (53.3%), 41.5% were single without a partnership and only a few were married (4.6%) or divorced (0.6%). None from this group were widowed and 3.6% had at least one child (see Table 1).

The distribution by federal states (Bundesländer) indicated that most of German students (57.8%) were from Baden-Württemberg (in which the University of Tübingen is located). Other federal states were less represented.

The distribution by field of studies showed that most participants studied medicine or dentistry (14.8%) and social and behavioral sciences (14.6%). Additionally, 25% of German students studied towards a state examination (Staatsexam), 24.4% towards the Diplom degree, 19.8% towards a bachelor degree, 13.5% towards a magister degree and 11.7% towards Lehramt (teaching degree for secondary schools). Only 2.4% studied towards a doctoral degree and 3.2% towards other degrees.

3.4.2.2 Follow-up assessment (T2)

Similar to the sample of international students, most of the German students who participated in the second data collection were female (69.3%). The average age was *M* = 24.75 years (*SD* = 3.81, range 19 - 52) years. At T2, 91.4% of German students were still enrolled at the

university while 8% already had completed their studies (0.6% were not enrolled due to other reasons).

3.4.3 Comparison of demographic characteristic between international and German students

Table 1 shows a comparison between both groups in the variables previously described. The results indicate that international and German students differed significantly in their marital status at T1. Post-hoc analyses using standardized residuals and a level of significance of .05 revealed that all categories (i.e. married, single, divorced or widowed) were significant contributors to the chi-square relationship between marital status and being an international or a German student. At T2, international and German students also differed significantly in the variable marital status. Post-hoc analyses indicate that only the category "married" was a significant contributor to the chi-squared relationship between these two variables.

Comparisons between samples based on the mean scores of the variable age showed that international students were significantly older at T1 and T2 than German students.

At T1, significantly more international students had children compared to German students. At T2, international and German students with and without children did not differ significantly.

The analyses show that at T1 and T2, there were no significant differences in gender distribution between international and German students.

Table 1

Comparison of demographic characteristics between international and German students at T1 and T2

	International students	German students			
Characteristic	*n* (%)	*n* (%)	χ^2	*df*	*p*
Gender T1			0.62	1	.43
Male	229 (31.8)	887 (33.3)			
Female	492 (68.2)	1775 (66.7)			
Gender T2			0.20	1	.65
Male	32 (28.6)	150 (30.7)			
Female	80 (71.4)	338 (69.3)			
Marital status T1			137.95	2	< .001
Married	121 (16.8)	123 (4.6)			
Single	587 (81.4)	2524 (94.8)			
Divorced or widowed	13 (1.8)	15 (0.6)			
Marital status T2			30.84	2	< .001
Married	23 (20.5)	24 (4.9)			
Single	88 (78.6)	457 (93.6)			
Divorced or widowed	1 (0.9)	7 (1.4)			
Children T1	64 (8.9)	95 (3.6)	35.68	1	< .001
Children T2	10 (8.9)	29 (5.9)	1.33	1	.24

Characteristic	*M* (*SD*)	*M* (*SD*)	*t*	*df*	*p*
Age T1	25.92 (4.73)	23.87 (4.07)	-10.61	1025.87	< .001
Age T2	26.22 (3.99)	24.75 (3.81)	-3.54	160.85	.001

Note. T1 international students $N = 721$, T1 German students $N = 2662$. T2 international students $N = 112$, T2 German students $N = 488$.

3.5 Measurement instruments

3.5.1 Mental disorders and stress: Patient Health Questionnaire (PHQ)

The Patient Health Questionnaire (PHQ) (Spitzer, Kroenke, & Williams, 1999) and its German version "Gesundheitsfragebogen für Patienten (PHQ-D)" (Löwe, Spitzer, Zipfel, & Herzog, 2002) were used for the assessment of mental disorders and stress. Although the PHQ was originally developed for use in primary care, it is also useful as an epidemiological instrument. The PHQ is a self-administrated version of the PRIME-MD (Spitzer, et al., 1994) and offers a categorical algorithm for the diagnoses of major depressive disorder, panic

disorder, bulimia nervosa, other depressive disorder, other anxiety disorder, probable alcohol abuse/dependence, binge-eating disorder and probable somatoform disorder. The first three disorders correspond to specific DSM-IV disorders (American Psychological Association, 1994), also called threshold disorders, while the other ones are subthreshold disorders, meaning that fewer symptoms are included compared to the ones that DSM-IV requires for the particular diagnoses. Furthermore, the PHQ includes a specific module for the assessment of psychosocial stressors.

For the present study the diagnoses assessed were 1) major depressive disorder (MDD), 2) other depressive disorder, 3) probable somatoform disorder and 4) other anxiety disorder.

The depression module of the PHQ (also called PHQ-9) has been shown to be a useful instrument to detect not only MDD but also other depression disorders (Martin, Rief, Klaiberg, & Braehler, 2006). The PHQ-9 is a short screening based on the nine key depression symptoms from the DSM-IV during the previous two weeks. Each of the nine items of this module can be rated from 0 (not at all) to 3 (nearly every day). MDD is diagnosed if five or more of the nine depressive symptoms criteria have been present for at least "more than half the days" and one of these symptoms is anhedonia or depressed mood. The question about suicidal or parasuicidal thoughts counts if present at all. Other depressive disorder is diagnosed according to the PHQ if in the past two weeks two, three or four depressive symptoms have been present for at least “more than half the days” and if one of the symptoms is anhedonia or depressed mood. The diagnosis of other depression disorder embraces both “depressive disorders not otherwise specified” (e.g. minor depression) and dysthymia, according to the DSM-IV.

In addition, it is possible to use the PHQ-9 for assessing and monitoring depression severity by using the sum score of the questionnaire (range 0-27) (Kroenke, Spitzer, & Williams, 2001). Furthermore, the PHQ-9 has been proved to be effective for the detection of depression among racially and ethnically diverse populations (Huang, Chung, Kroenke, Delucchi, & Spitzer, 2006) and a brief well-validated measure (Kroenke, Spitzer, Williams, & Lowe, 2010). The PHQ-9 has shown an excellent internal reliability (α = .89) and test-retest reliability in the English version (Kroenke, et al., 2001). Similar values were obtained for the German version (α = .85-.90) (Löwe, et al., 2004). In this study the depression scale also showed excellent internal consistency in the sample of international students (α = .85) and in the sample of German students (α = .83) at T1. Similarly, the internal consistency was also

excellent at T2 in the sample of international students (α =.85) and in the sample of German students. (α =.86).

The somatization module from the full version of the PHQ includes 13 somatic symptoms or symptom clusters (e.g. back pain, dizziness or headaches) in which participants are asked to rate whether they have been "not bothered", "bothered a little" or bothered a lot" by these symptoms during the last month. The diagnosis of probable somatoform disorder is applicable when three or more questions have been answered with "bother a lot" and there is no organic source. The term "probable" arises due to the fact that a complete medical evaluation would be needed to assure that the reported symptoms are not due to an organic cause. For the evaluation of a continuous measure of somatic symptom severity (also called PHQ-15), two additional items contained in the depression module ("feeling tired or having little energy" and "trouble sleeping") are included. Symptoms asked in the PHQ-15 embrace 14 of the 15 most prevalent DSM-IV somatic symptoms of somatoform disorder (Kroenke, Spitzer, & Williams, 2002; Liu, Clark, & Eaton, 1997). Each of the somatic symptoms of the PHQ-15 is scored 0-2 and the maximum score is 30. Previous studies found that the PHQ-15 showed a good internal reliability with a Cronbach's α of .80 (Kroenke, et al., 2002). Similar values of internal consistency were archive at T1 by the sample of international (α = .79) and German students (α = .76). At T2, the internal consistency in the sample of international students was α = .75 and in the sample of German students α = .77. Hereafter in the text, and for the sake of conciseness, probable somatoform disorder will be referred to as "somatoform disorder".

Regarding the anxiety module of the PHQ, all of the seven questions for the diagnosis of "other anxiety disorder" were included. The term "other" arises due to the fact that neither panic disorder nor phobias are included. The diagnosis of other anxiety disorder embraces both generalized anxiety disorder and anxiety not otherwise specified according to the DSM-IV. Participants are asked to answer if they have been bothered by the listed problems or symptoms (e.g. "feeling restless so that it is hard to sit still", "trouble falling asleep or staying asleep") "not at all", "several days" or "more than half of the days" over the last four weeks. Other anxiety disorder is diagnosed using the given algorithm when the question "feeling nervous, anxious, on the edge, or worrying a lot about different things" and three or more other problems or symptoms were present more than half of the days (Löwe, et al., 2002; Spitzer, et al., 1999). At T1, the internal consistency of this module was acceptable in the sample of international students (α = .72) and questionable in the sample of German students (α = .67). Higher internal consistency was found at T2 for international students (α = .84) and

for German students (α = .88). From now on in the text, and for the sake of conciseness, other anxiety disorder will be referred to simply as "anxiety disorder".

The last part of the full PHQ included in this study involves 10 questions about psychosocial stressors in areas like family or partnership, work or studies, health, sexuality, economic problems and personal stressful experiences which may be involved in triggering or maintaining mental disorders. Students were asked to answer how much they have been bothered by any of the listed problems in the last four weeks. A severity stress score can be obtained by adding the numeric expression of the answers of single items: "not bothered" (0), "bothered a little" (1) or "bothered a lot" (2) with a total range between 0 and 20. The internal consistency of this module at T1 was acceptable in the sample of international students (α =.73) and questionable in the sample of German students (α = .68). Similar values were found at T2 for international students (α = .74) and for German students (α = .63).

Finally, it is important to mention that although the PHQ has been proved to be an accurate, reliable, valid instrument and is widely used for research purposes, it has some limitations. Since the questionnaire is a self-report, it can not distinguish between medically explained and unexplained symptoms (Kroenke, et al., 2002). This distinction may be particularly relevant for example for depression, somatic and anxiety symptoms. Additionally, it is not possible to collect further information that might be needed to exclude other potential diagnoses. For example, in the case of depressive disorders it is not possible to explore antecedents of previous manic episodes, substances consume or whether the symptoms are associated to mourning with the PHQ. Definitive diagnoses should be verified by a clinician, taking into account if the patient or participant understood the questions correctly, as well as other relevant information.

3.5.2 Personality dimensions: NEO Five Factor Inventory (NEO-FII-30)

The NEO Five Factor Inventory (NEO-FFI) developed by Costa & McCrae is an abbreviated version of the Revised NEO Personality Inventory (NEO-PI-R) (Costa & McCrae, 1992), and is a widely used measure of the "five-factor model" of personality. The German version of this inventory was developed by Borkenau and Ostendorf (Borkenau & Ostendorf, 1993). This self-administered questionnaire assesses five personality traits: neuroticism, extraversion, openness to experience, agreeableness and conscientiousness. In this study, two personality dimensions, "Neuroticism" and "Extraversion", were assessed using the items included in the German short version "NEO-FFI-30" (Korner, et al., 2008). For the NEO-FFI-

30, six of the original 12 items of each scale of the NEO-FFI were selected using principal component analysis. To facilitate comprehension, items with negation or double negation were not included. In the NEO-FFI-30 responders are asked to indicate the degree to which they agree or disagree with each of the statements using a five-point likert scale that ranges from 0 = "Strongly Disagree" to 4 = "Strongly Agree". Scores are summed and have a range of 0-24 for each of the personality domains. The NEO-FFI-30 has been tested on a representative German population sample (N = 1908) and the factor structure was replicated in an independent sample (N = 2508) confirming the factor and construct validity of the instrument. Each of the five scales from the NEO-FFI-30 achieved good internal consistency and was highly correlated to the original version (r = .88.- .93). In the original version (NEO-FFI), the reliability for neuroticism was α = .82, and for extraversion was α = .73. In the short version (NEO-FFI-30), the reliability for neuroticism was α = .81, and α = .72 for extraversion (Korner, et al., 2008).

The present study showed good reliability for the neuroticism dimension in the sample of international students (α = .80) as well as for the control group (α = .83). Similar results to previous studies were found for the extraversion dimension where both samples had the same internal consistency (α = .72).

3.5.3 Social support: Social Support Questionnaire (F-SozU K-14)

Social support was assessed using the short version (F-SozU K-14) of the Social Support Questionnaire (F-SozU) (Fydrich, Sommer, & Brähler, 2007). The F-SozU is a German self-administrated instrument for measuring perceived social support and has been widely used in research, psychotherapy and for validating other research instruments, especially in German speaking countries. The items included in the questionnaire refer to different aspects of experienced support such as emotional support, instrumental support and social integration. Whereas in the standard form (S-54) it is possible to measure these components separately, in the short version perceived social support is measured as a single dimension. Because this instrument exists only in German, the scale was translated for the present study into English by three different translators (staff members of the Psychology Institut and Institute of Medical Psychology and Behavioral Neurobiology, University of Tübingen) who made parallel independent translations of the questionnaire and then agreed on a final version.

As well as in the original version, in the short version (F-SozU K-14), items are presented as statements (e.g. "I know several people with whom I enjoy getting together"). Participants are

asked to rate how applicable each statement of the questionnaire is to their current situation using a five likert scale from 1 (not at all applicable) to 5 (totally applicable). There are no inverse questions in this short version. For scoring, a sum of all answered items is calculated in which higher scores indicate higher perceived social support. The F-SozU K-14 is a useful instrument for research, in the psychotherapeutic practice or in counseling, due the possibility to get a fast and reliable overview of perceived social support (Frydrich, 2009). Further analyses showed that the F-SozU is an objective, valid and reliable instrument with regard to the construct of social support used for this questionnaire (Fydrich, et al., 2007).The F-SozU K-14 has shown a very good internal consistence ($\alpha = .94$) and test-retest reliability ($r = .96$) (Frydrich, 2009). In the present study, the internal consistence of this questionnaire was also excellent with a Cronbach's alpha of .92 in the sample of international students and $\alpha = .91$ in the sample of German students.

3.5.4 Resilience: The Resilience Scale (RS-11)

Resilience was measured using the German short version (RS-11) (Schumacher, 2005) of the original Resilience Scale (RS) developed by Wagnild and Young (1993). The same items from the RS-11 were taken from the original version for the English questionnaire. The aim of the Resilience Scale is to identify the degree of individual resilience, considered a positive personality characteristic that enhances individual adaptation. The RS has been widely used in research including males and females, all ages and different ethnic groups samples (Ahern, Kiehl, Sole, & Byers, 2006; Black & Ford-Gilboe, 2004; Christopher, 2000; Heilemann, Lee, & Kury, 2003; Nishi, Uehara, Kondo, & Matsuoka, 2010). All the RS items are positively worded, and responders are asked to specify the degree of agreement using a 7-point likert scale from 1, strongly disagree, to 7, strongly agree. Higher obtained scores reflect higher resilience. Concurrent validity has been supported by significant correlations between the scores of the RS and measures of constructs linked with resilience and outcomes of resilience like morale, life satisfaction, depression and health (Wagnild & Young, 1993). After using principal components analysis (PCA) followed by oblim rotation and Keiser normalization, Wagnild und Young (1993) suggested that a two-factor solution was interpretable: "Personal Competence"; and "Acceptance of Self and Life". However other studies could not replicate these results and showed rather one strong general factor and therefore a short single-dimension version (RS-11) was developed (Schumacher, 2005). The 11 items included in the RS-11 were selected using principal component analysis with oblique rotation and loading

values above .5. The RS-11 has proven to be a valid, reliable and efficient short version of the original version showing a good internal consistency (α =.91) and a high correlation with the full version (*r* = .95) (Schumacher, 2005). Similar results were found in the present study with a Cronbach's α of .88 and .90 for the international students and German student sample, respectively.

3.5.5 Traumatic life events: Traumatic Life Events Questionnaire (TLEQ)

Traumatic life events were assessed using a modified version of the Traumatic Life Events Questionnaire (TLEQ) (Kubany, et al., 2000). The TLEQ is a 22-item self-report instrument that assesses lifetime exposure to potentially traumatic events. The questionnaire includes 21 types of potentially traumatic events such as natural disasters, exposure to warfare, sudden death of a loved one, robbery involving a weapon and physical and sexual abuse and one nonspecific category of "other" life-threatening or highly disturbing events, where examples are given. Events are described in behaviorally descriptive terms, avoiding the use of terms that may be emotionally charged. Respondents are asked to answer whether they have or have not experienced each event and once an event was endorsed, to provide the number of times it occurred (ranging from "once" to "more than five times") as well as to indicate whether fear, helplessness or horror was present. For some specific events, other questions about more specific details of the happening are included. Finally, respondents are asked to identify and give specific information about the most distressing event among those endorsed. For the present study the answer format of the questionnaire was modified by only assessing if the traumatic events included in the TLEQ were experienced or not. A German translation of the events included in the TLEQ was made based on an unpublished German translation (Zumbeck & Teegen, 1997).

A limitation of measuring only the experience of a potential traumatic event as it is done in the present study is that further information (such as if this event caused an emotional response of fear, helplessness or horror or for example, or if the events occurred only once or over a long period of time), is not available.

3.5.6 Positive and negative life experiences: Life Experiences Survey (LES)

Positive and negative life experiences or events were assessed using a modified version of the Life Experiences Survey (LES) (Sarason, et al., 1978). The original instrument is a self-report questionnaire that contains a list of 57 specific events and three blank spaces where responders can write down other life events they may have experienced. Most of the events listed in the scale are common to individuals in a wide rage of situations or are designed primarily for students (e.g. death of a close family member, leaving home for the first time, failing a course, legal or financial difficulties). For this particular study, some items of the LES were not included because they were not suitable for a sample of students (e.g. retirement from work). The total number of specific events included in the study was 55. Responders were asked to indicate if they have experienced these events during the past year and to rate the impact of a particular event on a 7-likert scale from extremely negative (-3) to extremely positive (+3) at the time of occurrence, where 0 means no impact at all. After completion of the survey, events rated as positive are summed building a "positive change score". Similarly, a "negative change score" is obtained by summing the impact rating of events designated as negative. One important advantage of the LES is that it allows responders to give information about their own perception and individual impact of the experienced life events and the separate assessment of positive and negative life change. However, it should also be noticed that actual psychological states may influence the impact score of those events.

3.6 Statistical analysis

In the next section the statistical procedures used for data analysis in the present study are described. Analyses including only observed variables were performed using SPSS version 20 (Statistical Package for Social Sciences). Analyses including latent variables were conducted with Mplus 6.12.

Explorative analysis

Observed variables were tested for normality. Although statistical procedures for testing normality such as the Kolmogorov-Smirnov-test provide objective criteria while examining normality, they have the disadvantage of being oversensitive to large sample sizes like the

samples included in this study. Therefore, normal distribution was examined relying on visual inspection of normal Q-Q Plots and histograms for both samples.

The graphical analysis of risk and protective factors for mental disorders showed that extraversion scores presented a normal distribution in both samples (international and German students). On the contrary, social support, resilience and stress scores as well as the number of traumatic life events had a non-normal distribution in both samples. While stress scores at T1 and the sum of traumatic life events had a right skewed distribution in groups, social support and resilience showed a right skewed distribution in both samples. At T2, stress scores presented a relative normal distribution in the samples of both, international and German students. One difference was found for neuroticism values. While German students showed a more normal distribution, the distribution for the sample of international students was clearly not normally distributed, revealing a more right skewed distribution. Sum scores for positive and negative life experiences showed a right skewed distribution for both samples. Furthermore, the demographic variable age was clearly non-normally distributed, showing a right skewed distribution for both international and German students. Visual inspection of plots and graphics of variables including severity scores of depressive, somatic and anxiety symptoms at T1 revealed that all of these variables had a non-normal distribution showing a right skewed distribution. At T2, only the sum score of somatic symptoms had a nearly normal distribution for the sample of international students. All other severity scores at T2 were not normally distributed.

Missing data

In the online survey used in this study, it was specified that the questions included had to be answered in order to continue to the next section. Therefore, collected data does not include missing values by non-response. Only certain questions that were not applicable to all respondents include missing values by design (e.g. questions only for female participants). Furthermore, not all students who answered the survey at T1 did at T2. Hence, data at T2 includes missing values from non-responders at this time point.

Differences between groups

Mean differences of variables such as age or severity of symptoms between international and German students were tested using *t*-test for independent samples. Although most of the variables had a non-normal distribution which violates the assumption of normality of

parametric tests, in large samples the distribution of *t* tends to be normal. Therefore, some authors have suggested that parametric test may be conducted in samples above 50 scores (Field, 2009). If Levene's test for equality of variances was significant, degrees of freedom were adjusted.

Latent mean differences between samples were examined if full or partial scalar invariance was established. If so, latent means for the reference group (German students) were constrained to zero, whereas they were freely estimated for international students. An advantage of comparing groups on the basis of latent variables is due to latent means of constructs are estimated as part of a structural equation model and therefore error terms are also estimated (Cheung & Rensvold, 2000).

Differences between groups in categorical variables (e.g. diagnose of mental disorders) were tested using chi-squared tests.

Factorial validity of measurement instruments

In the present study the role of theoretical constructs such as neuroticism, extraversion, social support and resilience in predicting mental disorders and symptom severity was examined. These constructs can not be measured directly but only in terms of the direct measurement of observed variables that may be linked to these underlying constructs (also called latent variables). In the context of structural equation modeling (SEM), latent variables are estimated from observed variables or indicators (e.g. items from an instrument) that are presumed to represent the latent construct (Byrne, 2012). Confirmatory Factor Analysis (CFA) was conducted to test the validity of instruments for measuring the latent variables of neuroticism, extraversion, social support and resilience given the sample data. For the present study, the diagnosis of a mental disorder and symptom severity were considered to be directly measured and not as latent constructs. The reason is that items included in the measurement instrument (PHQ) represent specific symptoms from the DSM-IV rather than measuring an underlying construct. Also stress, traumatic life events and life experiences were assessed as observed variables in the present study since the items included in the scales refer to situations (e.g. specific events) that the responder may actually have experienced, rather than just be a theoretical construct.

In a first step, single models were established for each latent variable following the indications for the specific measurement instruments. Because not all variables had a normal distribution, models were tested using a robust maximum likelihood estimator (MLR) (Yuan

& Bentler, 2000). Model fit was judged on fit indices including comparative fit index (CFI) and root-mean-square of approximation (RMSEA). According to the suggested cut-off values, CFI values greater than .90 have been deemed an acceptable fit to the data (Marsh, Hau, & Grayson, 2005). A cut-off value for RMSEA close to .06 is typically taken to reflect relatively good fit to the data (Hu & Bentler, 1999). Chi-square statistic was also reported but not employed to estimate model fit since in the context of large sample sizes, it tends to produce significant results which results in the rejection of the model. If the model was rejected by the data, it was respecified in order to select the most appropriate model. Correlations of error terms were included only in the case of theoretical justification (Jöreskog, 1993). After a final model for each latent construct in the total sample was established, all of these models were tested simultaneously using CFA in the total sample to check for possible misspecified parameters (e.g. cross loadings). Modifications were made if necessary.

Factorial invariance of measuring instruments

In studies like the present, where two different groups or samples are compared based on results obtained from the same measuring instruments, it is important to test if measurement invariance can be established to determine the degree to which the same attribute is measured across groups, so that meaningful comparisons can be made (Vandenberg & Lance, 2000).

To determine if the measurement models were invariant between samples of international and German students, tests for measurement invariance were conducted using multi-group confirmatory factory analysis (MG-CFA) and robust maximum likelihood (MLR) as estimation method. More commonly, measurement invariance is tested based on the Chi-squared difference between two models ($\Delta\chi 2$) where a non-significant improvement in fit supports measurement invariance. However, the chi-square test is strongly susceptible to sample size and therefore it has been suggested that other alternative indices may be used for decisions on measurement invariance (Cheung & Rensvold, 2002). As suggested by these authors, criterion of ΔCFI >.01 was used for rejecting the null hypothesis of invariance.

Vandenberg and Lance (2000) recommended a sequence of steps to test measurement invariance. Based on their recommendations, a sequence of increasingly constrained models was tested. First, a baseline model to test configural invariance for each group was specified with the same pattern of fixed and free factor loadings. For identification of the model, the first factor loading of each latent variable was set to one in all groups while other factor loadings were freely estimated. Latent means were fixed to zero in both groups. This model

served as baseline against which the subsequent test invariance was compared. If the first level of invariance (configural invariance) was established, it means that the same factor structure held for the two samples. In a second step, metric invariance was tested by constraining factor loadings of the same items to be equal across groups. The objective of testing for metric invariance is to know to on which extent different groups perceive and interpret each item of the instrument in the same way (Byrne, 2008). If the requirements for metric invariance or at least for partial metric invariance were met, the next level of invariance was tested. In a third step, intercepts of observed variables were constrained equal across groups to test for scalar invariance. When testing for scalar invariance, means of latent variables were set to zero only in the reference group. Scalar invariance indicates that "differences in the means of observed items are due to differences in the means of underlying construct(s)" (Steenkamp & Baumgartner, 1998, p. 80). Therefore, if this level of invariance was reached, comparisons of mean scores between groups were made. If at some level the requirements for full invariance were not met, partial measurement invariance was tested. This means that most, but not all parameters are equivalent across samples (Byrne, Shavelson, & Muthen, 1989).

Interaction terms

Differences in the effects of predictors between international and German students on the outcome variables were examined by including interaction terms between the variable international/German student and all other predictors in the regression models. Following the recommendations of Aiken and West (1991), continuous predictors were centered around their grand mean so that the value of zero is the mean of each predictor. Centering has the advantage of maximizing the interpretability of interactions and of minimizing multicollinearity problems (Aiken & West, 1991). As these authors suggested, interaction terms based on a strong theory should be tested and also included in the final model even if the interaction term was not significant, in order to contribute to further research. Taking into account the large body of literature addressing the buffering effect of social support on the impact of stress (see 1.3.2.2), the interaction between these two variables was included in regression models and not dropped from final models if not significant. Lower-order interactions of significant higher-order interactions were always kept in the model. If interaction terms were significant, they were plotted at one *SD* below (low) and one *SD* above the mean (high) of predictors.

Regression analysis on continuous outcomes

Multiple linear regression analysis on the severity of depressive, somatic and anxiety symptoms were performed using Mplus 6.1 software and multigroup analysis including observed and latent variables. Latent potential predictors (neuroticism, extraversion, social support and resilience) were specified according to the final model for testing scalar invariance and MLR was used as estimator.

At T1, four models for each outcome variable were tested in successive steps. All continuous variables were centered around the grand mean. The first model included only main effects of predictors in the total sample. In a second step, the interaction term between the observed variable stress and the latent variable of social support was included in the model to test the hypothesis of the buffer effect of social support. In the third model, interaction terms between variables included in the second model and the variable international/German student were tested to explore significant differences between samples regarding the effects of predictors on the outcome variable. Finally, in a fourth model, only main effects of predictors and results from significant interactions from the third model were included as well as the interaction between social support and stress. Significant interaction terms were plotted based on the results of this last model. Because the software does not compute beta coefficients for interaction terms in structural equation modeling, these coefficients were calculated as following (Marsh, Wen, & Hau, 2004):

$$\gamma_1'' = \gamma_1 \frac{sd(\xi_1)}{sd(\eta)}, \gamma_2'' = \gamma_2 \frac{sd(\xi_2)}{sd(\eta)}, \gamma_3'' = \gamma_3 \frac{sd(\xi_1)sd(\xi_2)}{sd(\eta)} \quad (1)$$

Where *sd* represents standard deviation, ξ_1 and ξ_2 are mean centered variables, η is the outcome variable and γ_1'', γ_2'', γ_3'' are "standardized" coefficients.

Furthermore, an additional model for symptoms at T1 was tested only for the sample of international students. Here, the role of specific predictors for this group (e.g. knowledge of German language, homesickness, frequency of being in contact with the family) was explored. All these new variables were controlled for observed and latent main effects of predictors from previous models.

Multiple regression analyses including observed and latent predictors were also conducted on the severity of depressive, somatic and anxiety symptoms at T2. Continuous variables were also centered around the grand mean. In regression analyses on severity scores at T2 all data available were taken into account, namely data from students who completed the survey on

both occasions and also data from those who participated only at T1. A first model was tested including main effects of predictors at T1 as well as main effects of predictors assessed at T2. Symptom severity at T2 was controlled for severity scores at T1. Stress levels at T2 were also controlled for stress levels at T1. In a second model, interaction terms between predictors and the variable international/German student were calculated to test for significant differences between samples in the effect of such variables. The interaction term between social support and stress was not included because social support was assessed only at T1. Finally, a third model was specified including only main effects of predictors and significant interactions. Simple slopes were calculated for significant interactions and plotted.

Regression analysis on binary outcomes

Logistic regression analyses were conducted on the diagnoses of MDD, other depressive disorder, somatoform disorder and anxiety disorder. Because of the M-plus software limitations in the analysis of complex regression models with binary outcomes and interactions including latent variables, logistic regressions were conducted using SPSS and observed variables and their interactions. Continuous variables were centered around the grand mean and all analyses were conducted using the "enter" method. In the first model, only main effects of predictors were tested. In the second model, the theory-based interaction term between social support and stress was added. In a third model, differences in the effects of predictors between international and German students were explored by including interactions between the variable international or German student and all other predictors. Finally, a forth model was specified including only significant interactions from the third model and the theory based interaction between social support and stress. Significant interactions from this last model were plotted at one *SD* below (low) and one *SD* above the mean (high) of predictors.

Due to the considerably smaller sample size at T2 and the large amount of potential predictors, it was not possible to conduct logistic regression analysis on diagnose at T2, and differences between T1 and T2 were analyzed based only on the severity scores of symptoms.

Statistical significance and effect size

In the present study, the exact *p* value was always reported. All analyses were two-tailed tests. The conventional cut-off point of $p < .05$ was used for significance levels.

When chi-squared tests were conducted to test for significant differences between groups as well as when logistic regression analyses were conducted, odd ratios (*OR*) were used as effect size. When conducting *t*-tests to compare means between samples, Cohen's *d* was used as effect size and was reported for the significant differences according to the following formula:

$$d = \frac{M_{group1} - M_{group2}}{SD_{pooled}} \quad (2)$$

Values of *d* were interpreted following Cohen's guidelines where 0.2, 0.5 and 0.8 represent a small, medium and large effect respectively (Cohen, 1988).

4 Results

In the next section the results of this study will be presented. First, prevalence rates of mental disorders among international and German students will be described and compared. Gender differences, comorbidity, and severity of symptoms will be examined. Additionally, results regarding current treatment among those students diagnosed with a mental disorder will be explained. Furthermore, differences between international and German students in the scores of possible predictors of mental disorders will be displayed. In a second part, results of analyses of factorial validity and measurement invariance of instruments for the assessment of neuroticism, extraversion, social support and resilience will be reported in detail. In the third part, the effect of possible predictors on diagnoses of mental disorders at T1 will be examined. In the fourth part, results of regression analyses on the severity of symptoms at T1 will be presented. Finally, the effect of possible predictors on the severity of symptoms at T2 will be described.

4.1 Prevalence rates and descriptive results of mental disorders and predictors

4.1.1 Prevalence rates of mental disorders in the total sample at T1

The prevalence rates of mental disorders at T1 for the total sample including both German and international students indicated that 28.6% of the students met criteria for at least one mental disorder examined in the present study according to the PHQ. The highest prevalence rates were for the diagnosis of somatoform disorder (13.5%), followed by MDD (10.4%) and other depressive disorder (10%) (see Table 2).

4.1.1.2 Gender differences

At T1, 31% of the female students met criteria for at least one diagnosis of mental disorder according to the PHQ. This percentage was significantly higher than for males (22%); χ^2 (1) = 34.1, $p < .001$. When adjusting for age, females were still more likely to meet diagnostic criteria for at least one mental disorder compared to males (adj. *OR* = 1.64).

Some differences were found by comparing the specific prevalence rates of mental disorders among female and male students in the total sample. The major difference between females and males was found for the diagnosis of somatoform disorder. Results indicated a significant

association between gender and this disorder; χ^2 (1) = 75.11, p < .001. Female students reported higher prevalence rates compared to males (17.1% versus 6.3%), being three times more likely to meet diagnostic criteria for somatoform disorder, when age was held constant (adj. *OR* = 3.09).

Female and male students also differed in the prevalence rates of the diagnosis of anxiety disorder. Again, females showed significant higher rates compared to males (4.6% versus 2.8%; χ^2 (1) = 12.39, p < .001). After adjusting for age, females were two times more likely to screen positive for this disorder (adj. *OR* = 2.03).

No significant association was found between gender MDD and other depressive disorders in the total sample (see Table 2).

Table 2

Prevalence rates of mental disorders in the total sample. Male-female comparison

	Total (*N* = 3383)	Male (*N* =1046)	Female (*N* = 1879)				95% - CI	
Diagnosis	*n* (%)	*n* (%)	*n* (%)	χ^2	*df*	*p*	Adj. *OR*	Lower	Upper
Major depressive disorder	351 (10.4)	107 (9.6)	244 (10.8)	1.11	1	.29	1.13	0.89	1.44
Other depressive disorder	337 (10.0)	102 (9.1)	235 (10.4)	1.25	1	.26	1.14	0.89	1.46
Somatoform disorder	458 (13.5)	70 (6.3)	388 (17.1)	75.11	1	< .001	3.09	2.37	4.04
Anxiety disorder	155 (4.6)	31 (2.8)	124 (5.5)	12.39	1	< .001	2.03	1.36	3.04
Any PHQ diagnosis	966 (28.6)	246 (22.0)	720 (31.0)	34.61	1	< .001	1.64	1.39	1.94

Note. χ^2 = chi-square between males and females. Adj. *OR* = odd ratios adjusted for age. Gender = male as reference category.

4.1.2 Prevalence rates of mental disorders among international and German students

The prevalence rates of mental disorders at T1 according to the PHQ in the sample of international and German students revealed that 29.5% of international students and 28.3% of German students met criteria for at least one mental disorder. Chi-square tests of independence were performed to compare the frequency of mental disorders between both samples. Results indicated that although international students showed higher prevalence rates

than German students for a diagnosis of MDD, other depressive disorder, somatoform disorder and anxiety disorder, these differences were not significant. Furthermore, no significant association was found between having at least one mental disorder and being an international or a German student; χ^2 (1) = 0.438, p = .50.

As shown in the Table 3, the most frequent diagnoses in both samples were somatoform disorder and MDD: 13.9% of international students and 13.4% of German students met criteria for somatoform disorder at T1, while 11.2% of international and 10.1% German students met criteria for MDD.

Table 3

Prevalence rates of mental disorders in the samples of international and German students

	International Students (N =721)	German Students (N = 2662)			
Diagnosis	*n* (%)	*n* (%)	χ^2	*df*	*p*
Major depressive disorder	81 (11.2)	270 (10.1)	0.72	1	.39
Other depressive disorder	75 (10.4)	262 (9.8)	0.19	1	.65
Somatoform disorder	100 (13.9)	358 (13.4)	0.08	1	.76
Anxiety disorder	39 (5.4)	116 (4.4)	1.43	1	.23
Any PHQ diagnosis	213 (29.5)	753 (28.3)	0.43	1	.50

4.1.2.1 Gender differences

Prevalence rates of each mental disorder were analyzed separately for females and males in both samples.

<u>International Students</u>

Female international students more frequently met diagnostic criteria of at least one mental disorder (31.7%) than international male students (24.9%). However, this difference was not significant; χ^2 (1) = 3.48, p = .06 (see Table 4).

The only diagnosis that showed a significant difference between males and females was somatoform disorder. Female international students showed higher prevalence rates of somatoform disorder than male international students (17.1% versus 7.0%). The results

showed that there was a significant relationship between this diagnosis and gender; χ^2 (1) = 13.31, $p < .001$. Female international students were 2.7 times more likely to screen positive for somatoform disorder than international male students (adj. *OR* = 2.78).

Table 4

Prevalence rates of mental disorders by gender in the sample of international students

	Male (*N* =229)	Female (*N* =492)					CI 95%	
Diagnosis	*n* (%)	*n* (%)	χ^2	*df*	*p*	Adj. *OR*	Lower	Upper
Major Depressive disorder	25 (10.9)	56 (11.4)	0.03	1	.85	1.04	0.63	1.73
Other depressive disorder	22 (9.6)	53 (10.8)	0.23	1	.63	1.09	0.64	1.84
Somatoform disorder	16 (7.0)	84 (17.1)	13.31	1	< .001	2.78	1.58	4.87
Anxiety disorder	12 (5.2)	27 (5.5)	0.19	1	.89	1.02	0.50	2.06
Any PHQ diagnosis	57 (24.9)	156 (31.7)	3.48	1	.06	1.38	0.97	1.97

Note. Adj. *OR* = odds ratio adjusted for age. Gender: Male as reference category.

German Students

There was a significant association between gender and the prevalence rates of at least one of the PHQ diagnosis in the sample of German students. German females had significantly higher prevalence rates than males; χ^2 (1) = 31.94, $p < .001$ (see Table 5). German female students were 1.7 times more likely to meet diagnostic criteria for at least one mental disorder compared to German male students (adj. *OR* = 1.72).

Similarly to the sample of international students, the gender distribution in the sample of German students showed that females had higher prevalence rates of somatoform disorder than males (17.1% vs. 6.1% respectively). Chi-squared test indicated that there was a significant relationship between gender and this diagnosis; χ^2 (1) = 61.92, $p < .001$. German females showed a significantly higher risk for somatoform disorder compared to males when adjusting for age (adj. *OR* = 3.19).

Results for the diagnosis of anxiety disorder showed that female (5.5%) and male (2.1%) German students differed significantly in the prevalence rates of this disorder; χ^2 (1) = 15.67, $p < .001$. German female students were 2.6 times more likely than German male students to meet criteria for this disorder (adj. *OR* = 2.66).

Table 5

Prevalence rates of mental disorders by gender in the samples of German students

	Male (*N* =1046)	Female (*N* = 1879)					CI 95%	
Diagnosis	*n* (%)	*n* (%)	χ^2	*df*	*p*	Adj. *OR*	Lower	Upper
Major depressive disorder	82 (9.2)	188 (10.6)	1.18	1	.27	1.16	0.88	1.52
Other depressive disorder	80 (9.0)	182 (10.3)	1.02	1	.31	1.15	0.87	1.52
Somatoform disorder	54 (6.1)	304 (17.1)	61.92	1	< .001	3.19	2.36	4.32
Anxiety disorder	19 (2.1)	97 (5.5)	15.67	1	< .001	2.66	1.61	4.38
Any PHQ diagnosis	189 (21.3)	564 (31.8)	31.94	1	< .001	1.72	1.42	2.08

Note. Adj. *OR* = odds ratio adjusted for age. Gender: Male as reference category.

4.1.3 Prevalence rates by nationality in the sample of international students

Prevalence rates of mental disorders were computed for each group of nationality in the sample of international students (see Table 6). Results showed that students coming from Middle and Eastern Europe had the highest prevalence rates of at least one mental disorder (37.1%), followed by students from North Africa and the Near East (31%), and from Latin America (30.4%). Students coming from the U.S., Australia and Oceania had the lowest prevalence rates of at least one mental disorder (16%).

Results of prevalence of MDD indicated that students from Latin America (15.9%) and Middle and East Europe (14.4%) had the highest prevalence for this mental disorder compared to other international students. The lowest prevalence rates were found among students coming from Sub-Saharan Africa (4.5%) and from the U.S., Australia and Oceania (6%).

Students from Middle and Eastern Europe had the highest prevalence rates of other depressive disorder among international students (15%) followed by students from Sub-Saharan Africa (13.6%). Again, students from the U.S., Australia and Oceania had the lowest prevalence rates compared to other students of this sample (6%).

Students coming from North Africa and the Near East and students from the former URSS had the highest prevalence rates among international students of somatoform disorder (21.4%

and 17.3% respectively). The lowest prevalence rates of this disorder were found among students from the U.S., Australia and Oceania (4%).

Students from Sub-Saharan Africa (9.2%) and from Latin America (7.2%) met more frequently diagnostic criteria for anxiety disorder compared to other international students. Students from Western Europe (3.1%) and from the U.S., Australia and Oceania (4%) showed the lowest prevalence rates of this mental disorder.

Table 6

Prevalence rates of mental disorders by groups of nationality in the sample of international students

	WE *n* = 130	M-E EU *n* = 167	US/A/O *n* = 50	LA *n* = 69	NA/NE *n* =42	A/SS *n* = 22	ASIA *n* = 130	F-USSR *n* = 110
Diagnosis	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
Somatoform disorder	14 (10.8)	26 (15.6)	2 (4.0)	10 (14.5)	9 (21.4)	3 (13.6)	16 (12.3)	19 (17.3)
Major Depression	10 (7.7)	24 (14.4)	3 (6.0)	11 (15.9)	5 (11.9)	1 (4.5)	15 (11.5)	11 (10.0)
Other depressive disorder	12 (9.2)	25 (15.0)	3 (6.0)	7 (10.1)	3 (7.1)	3 (13.6)	14 (10.8)	8 (7.3)
Anxiety disorder	4 (3.1)	10 (6.0)	2 (4.0)	5 (7.2)	2 (4.8)	2 (9.1)	8 (6.2)	6 (5.5)
Any PHQ diagnosis	34 (26.2)	62 (37.1)	8 (16.0)	21 (30.4)	13 (31.0)	5 (22.7)	39 (30.0)	30 (28.5)

Note. WE = Western Europe; M-E EU = Middle and Eastern Europe; US/A/O = US, Australia and Oceania; LA = Latin America; NA/NE = North Africa and the Near East; A/SS = Sub-Saharan Africa; F-USSR = Former USSR. Chi-squared tests were not conducted because several cells had frequencies less than 5.

4.1.4 Comorbidity of mental disorders

The results at T1 showed that from the group of students who screened positive for at least one mental disorder, 69% of international students and 72.6% of German students met diagnostic criteria for one mental disorder, 23.5% of international students and 21.1% of German students for two mental disorders and 7.5% of international students and 6.2% of German students for three mental disorders according to the PHQ. The status of being an international or a German student was not significantly associated to the number of comorbid mental disorders; χ^2 (2) = 1.14, p = .56.

Out of those international and German students who met diagnostic criteria for MDD at T1, 39.5% and 38.9%, respectively, also had the diagnosis of a somatoform disorder and 30.9% and 27.8%, respectively, had the diagnosis of anxiety disorder.

Out of those international and German students who met diagnostic criteria for other depressive disorder, 24% and 16.8%, respectively, also met criteria for the diagnosis of somatoform disorder and 1.3% and 6.1%, respectively, for anxiety disorder.

Out of those international and German students who had the diagnosis of anxiety disorder, 64.1% and 64.7%, respectively, also met diagnostic criteria for MDD; 2.6% and 13.8%, respectively, for other depressive disorder and 56.4% and 51.7%, respectively, for somatoform disorder.

Because diagnosis of MDD and other depressive disorders are mutually exclusive, no association between these two diagnoses was assessed.

Differences between international and German students in the comorbidity of mental disorders were tested for each pair of diagnosis using the chi-squared tests. Results indicated that international and German students did not differ significantly in any of the co-occurrence of mental disorders.

4.1.5 Mean differences of symptom severity

T-tests were conducted to compare mean scores of symptom severity according to the PHQ between the total sample of international and German students at T1 and T2.

Depressive symptoms

The results of *t*-tests did not show a significant difference in the severity of depressive symptoms at T1 between international (M = 6.92, SD = 5.08) and German students (M = 6.70, SD = 4.55); t (1053.30) = -1.04, p = .29.

Similar results were found at T2. There was no significant difference in the mean scores of depressive symptoms between international (M = 6.95, SD = 5.10) and German students (M = 6.36, SD = 4.78); t (598) = -1.14, p = .25.

Somatic symptoms

Results from *t*-test analysis to compare the severity of somatic symptoms between samples at T1 showed that there was no significant difference between international (M = 7.21, SD = 4.74) and German students (M = 7.19, SD = 4.30); t (1062.03) = -0.08, p = .93.

Similarly, no differences between samples of international students (M = 8.00, SD = 5.07) and Germans students (M = 7.06, SD = 4.33) were found at T2; t (150.27) = -1.82, p = .07.

Anxiety symptoms

International students (M = 4.26, SD = 3.52) and German students (M = 4.01, SD = 3.50) did not differ significantly in the severity of anxiety symptoms at T1; t (3381) = -1.70, p = .08.

However, a significant difference in the severity of anxiety symptoms was found at T2. The results indicated that international students (M = 4.96, SD = 3.27) reported significantly higher anxiety scores at this time point compared to German students (M = 3.90, SD = 3.51); t (598) = -2.91, p = .004, d = 0.31.

4.1.6 Remission rates of mental disorders

From the group of international students who were diagnosed with at least one mental disorder at T1 (i.e. MDD, other depressive disorder, somatoform disorder or anxiety disorder), 63.3% (n = 19) still met diagnostic criteria for at least one mental disorder at T2. From the group of German students who were diagnosed with at least one mental disorder at T1, 46.5% (n = 66) still met diagnostic criteria for at least one mental disorder. Although international students showed lower remission rates at T2 compared to German students, this difference was not significant; χ^2 (1) = 2.81, p = .09.

Taking into account that remission rates in both samples at T2 did not differ significantly and the smaller sample sizes at this time point, remission rates of each mental disorder were calculated for the total sample.

Major depressive disorder

From the group of students who were diagnosed with MDD at T1 (n = 351), only 54 students took part at T2. From this group, 48.1% (n = 26) still met diagnostic criteria for MDD at T2 and 9.3% (n = 5) for other depressive disorder. Criteria for full remission (students who were not diagnosed with any depressive disorder at T2) were met by 42.6% of those students with MDD at T1 who also participated at T2.

Other depressive disorder

From the group of students who were diagnosed with other depressive disorder at T1 (n = 337), 73 students also participated at T2. From this group, 11% (n = 8) still met diagnostic criteria for this mental disorder, 13.7% (n = 10) for MDD and 75.3% did not met diagnostic criteria for any depressive disorder at T2.

Somatoform disorder

From the group of students who were diagnosed with somatoform disorder at T1 (n = 458), 75 students took part at T2. Out of those, 46.7% (n = 35) still met diagnostic criteria for somatoform disorder at T2.

Anxiety disorder

From the group of students who were diagnosed with anxiety disorder at T1 (n = 155), only 25 participated at T2. Out of those, 32% (n = 8) still met diagnostic criteria for anxiety disorder at T2.

4.1.7 Medication and treatment

At T1, students were asked if, based on their actual condition, they thought they needed psychiatric or psychological assistance, or if they were currently in psychiatric or psychological treatment. Also, participants were asked which medication they were taking. From the sub-sample of students who met criteria for at least one mental disorder at T1 (i.e. MDD, other depressive disorder, somatoform disorder or anxiety disorder), 30% of international students and 21.4% of German students reported the necessity of psychiatric or psychological assistance; χ^2 (1) = 6.97, p = .008, OR = 1.57. In the same group, significantly more German students actually were in psychiatric or psychological treatment (11.6%) compared to international students (6.6%); χ^2 (1) = 4.40, p = .03, OR = 0.53.

Regarding medication use, international and German students who at T1 had at least one of the assessed mental disorders, did not differ in the intake of any psychotropic medication (i.e. antidepressants, hypnotics, mood stabilizers, or anticonvulsants); χ^2 (1) = 0.28, p = .59.

From the group of students who met diagnostic criteria for any diagnosis at T1, 3.8% of international students and 5.3% of German students were taking antidepressants. Also, 0.5% of international students and 0.9% of Germans students were taking mood stabilizers or anticonvulsants. Additionally, 1.9% of international students and 0.7% of German students were taking hypnotics (benzodiazepines and benzodiazepine-like). Information about other medication is not reported here due to low frequencies.

4.1.8 Mean differences of possible predictors of mental disorders

T-tests were conducted to test for significant differences of observed (not latent) means of psychological predictors of mental disorders between samples of international and German students.

Neuroticism

A *t*-test was conducted to test the difference in observed neuroticism mean scores between international (M = 5.58, SD = 4.12) and German students (M = 10.41, SD = 4.98). Results indicated that international students had significantly lower neuroticism scores than German students, t (1344.18) = 26.63, $p < .001$, d = -1.05.

Extraversion

A significant difference was also found between international (M = 9.25, SD = 3.47) and German students (M = 14.09, SD = 3.53) for observed extraversion scores. International students showed significantly lower extraversion scores compared to Germans; t (3381) = 32.75, $p < .001$, d = - 1.38.

Social support

Results indicated a statistical difference between international and German students in terms of observed values of social support. Compared to Germans (M = 59.46, SD = 8.81), international students (M = 53.30, SD = 11.68) reported significantly lower scores of social support; t (952.98) = 13.17, $p < .001$, d = - 0.59.

Resilience

Results indicated that there was no significant difference in observed resilience scores between international (M = 58.77, SD = 11.01) and German students (M = 58.22, SD = 10.81); t (3381) = -1.21, p = .34.

Stress

Differences between international and German students in stress levels assessed by the PHQ at T1 and T2 were tested.

Results showed that at T1, international students (M = 6.19, SD = 3.78) reported significantly higher stress values than German students (M = 5.15, SD = 3.24); t (1024.03) = -6.73, $p < .001$, d = 0.29.

Similarly, at T2, international students (M = 6.28, SD = 3.83) reported higher stress values compared to German students (M = 4.75, SD = 2.95); t (142.76) = -3.94, $p < .001$, d = 0.44.

Traumatic life events

Significant differences in the number of traumatic life events were found between both samples. International students (M = 3.17, SD = 2.75) reported that they had experienced more traumatic life events compared to Germans (M = 2.31, SD = 2.09); t (956.83) = -7.77, p < .001, d = 0.35.

Additionally, most of the international and German students have experienced at least one traumatic life event (84.9% and 81.3%, respectively).

Positive life experiences

Results of t-tests indicated that international (M = 6.11, SD = 4.98) and German students (M = 5.55, SD = 5.24) did not differ in scores of positive life experiences between T1 and T2; t (598) = -1.03, p = .30.

Negative life experiences

According to the data, international students (M = 8.35, SD = 9.26) experienced significantly more negative events between T1 and T2 compared to German students (M = 5.77, SD = 5.78); t (131.49) = -2.81, p < .001, d = 0.33.

4.2 Factorial validity and measurement invariance of instruments

In this section, results from analyses to test factorial validity and measurement invariance are presented. In this study, the constructs of neuroticism, extraversion, social support and resilience were included as predictors of mental disorders and severity of symptoms. Because these represent theoretical constructs that cannot be measured directly (latent constructs) but are rather inferred from observed variables (items from scales or questionnaires), the factorial validity of the measurement instruments for the assessment of neuroticism, extraversion, social support and resilience was tested in order to examine how well these instruments measure these constructs given the data from the present study. Secondly, measurement invariance across samples was tested for each of the latent variables (i.e. neuroticism, extraversion, social support and resilience). Testing measurement invariance is important in studies like the present one in which groups are compared based on the results of measurement instruments. Therefore, it is crucial to examine if the same constructs are measured in the same way in both samples in order to be able to make meaningful

comparisons. Finally, latent means were compared between samples of international and German students if requirements for at least partial scalar invariance were met.

4.2.1 Testing the factorial validity of measuring instruments

Neuroticism

A first model for the latent factor of neuroticism was specified by including the items of this dimension from the short version of the NEO-FFI (NEO-FFI-30). Although CFI indicated a good fit to the data, RMSEA reflected that the model did not fit the data well; χ^2 (9) = 302.497, $p < .001$, CFI = .954, RMSEA = .098. A reason for the poor fit could be explained due to the fact that in the original version of this instrument (NEO-PI-R), each personality dimension includes sub-scales or facets. Therefore, items coming from the same facet may have shown higher correlations. Taking this information into account, a new model was specified where residual variances for two items coming from the same facet were freed to correlate. Moreover, a review of the modification indices revealed the presence of residual covariances involving two pairs of items. In this particular case, these results could have been influenced by the item order used in this study showing residual correlations between consecutive items of the neuroticism scale. A possible explanation might be that in contrast to the original scale where items of neuroticism are alternated with items from other personality dimensions, for the present study selected items included in the short version were used following the order of the original scale and not using an alternate order. Therefore, these residual correlations were added in the second model. Results of this final model showed a large improvement in fit over the first model; χ^2 (5) = 38.984, $p < .001$, CFI = .995, RMSEA = .045.

Extraversion

A first model for the scale of extraversion was specified for the total sample as a single factor as suggested for the short version of the NEO-FFI (NEO-FFI-30). Both CFI and RMSEA indices indicated a poor fit to the data; χ^2 (9) = 472.404, $p < .001$, CFI = .898, RMSEA = .123. In the same way as for neuroticism, new parameters were specified allowing the residual variances from items of the same facets of the original scale to correlate, which was the case for two pairs of items of this personality dimension. Moreover, examination of modification indices showed one residual covariance with a large value. By checking these two items it

became clear that this may be due to a similar wording of the statements in the German Version, which included the idea if being "in the middle" of something ("Ich bin gern im Zentrum des Geschehens" and "Ich habe gerne viele Menschen um mich herum"). In the newly specified model residual variances of these two items were also freed to correlate. Results indicated a substantially improvement over the first model and a reasonable fit to the data; χ^2 (6) = 94.663, p < .001, CFI = .981, RMSEA = .066.

Social support

For the scale of social support, a model was established as a single dimension according to the specifications for the short version of the F-SozU (F-SozU K-14). Fit indices revealed that this first model did not fit the data well; χ^2 (77) = 2252.881, p < .001, CFI =.875, RMSEA = .091. As it was done before for the other instruments, the full version of this questionnaire was carefully reexamined. In the original version of the F-SozU, three types of perceived social support are distinguished, namely emotional support, instrumental support and social integration. Consequently, a new model was specified where residual variances from items of the short version that belonged to the same type of social support were allowed to covary. This second model showed a reasonable fit to the data; χ^2 (43) = 637.496, p < .001, CFI =.966, RMSEA = .064 and was used as the final model for further analysis.

Resilience

CFA was applied to the scale used to assess resilience (RS-11) in the same manner as the prior measures. A first model for resilience was specified based on the indications for the short version which recommended that resilience should be considered a single dimension. Fit indices of this first model suggested a poor fit to the data; χ^2 (44) = 1550.737, p < .001, CFI =.875, RMSEA = .101. However, considering that the items included in the scale were taken from the original version in which two factors are described (personal competence and acceptance of self and life), residual variances of the only two items coming from the second resilience factor were freed to correlate in a new model. Furthermore, examination of modification indices revealed a model misspecification involving two items of the scale. This could be explained due to similar wording of these particular items ("keeping interested in things is important to me" and "I keep interested in things"). The respecification of the model including these correlated residuals resulted in a better fit to the data; χ^2 (42) = 872.206, p < .001, CFI =.931, RMSEA = .073.

The full model

In a further step, CFA was conducted on the total sample (international and German students together) using the measurement instruments that assessed the four latent variables included in the present study (i.e. neuroticism, extraversion, social support and resilience). The model for each latent construct was specified according to the final models previously established for each latent construct. Fit indices of this full model revealed an acceptable fit to the data; χ^2 (580) = 5408.782, $p < .001$, CFI = .905, RMSEA = .050, but the inspection of modification indices indicated probable cross loadings between scales. The first pair of items that seemed to be highly correlated included one item of the resilience scale ("I can usually find something to laugh about") and another for measuring extraversion ("I laugh easily"). It could be noticed that these two items had a similar formulation that included the idea of laughing frequently. The second high modification indices value from items coming from different scales included one item from the resilience scale ("I am friends with myself") and one item from neuroticism ("sometimes I feel completely worthless"). The negative association between both items, that could be better appreciated in the German translation of the instruments, could be due to their relation to self-worth and comprehended a positive and a negative valuation of oneself. Taking all of this information into account, a new model was specified where residual variances of these two pairs of items were freed to correlate. The newly specified model showed an improvement in fit indices; χ^2 (578) = 4718.243, $p < .001$, CFI = .919, RMSEA = .046, and it was used as a final model for further analysis of risk factors of mental disorders along with other variables.

4.2.2 Testing measurement invariance across samples

In this section, results of configural, metric and scalar invariance of measurement instruments that assess latent constructs across samples of international and German students are presented. These analyses were conducted using multigroup confirmatory factor analysis (MG-CFA). The final full model established for the total sample (see 4.2.1) was used as baseline model against which all subsequently specified models were compared. Results are presented in Table 7.

Neuroticism

The baseline model for neuroticism which was previously specified (see 4.2.1) was freely estimated for both samples using MG-CFA. For identification of the model, the first factor loading was set to one. The results of this first model showed a good fit to the data; χ^2 (10) = 43.121, p < .001, CFI = .994, RMSEA = .044. After this first step, metric measurement invariance was tested using a model with constrained factor loadings; χ^2 (15) = 66.881, p < .001, CFI = .990, RMSEA = .045. Fit indices and particularly ΔCFI indicated that metric invariance was held and scalar invariance could be tested. In a third step, fit indices of the model with constrained factor loadings and intercepts were examined; χ^2 (20) = 192.947, p < .001; CFI = .967, RMSEA = .072. Results indicated that ΔCFI was grater than 0.01 and therefore full scalar invariance was rejected. Consequently, the aim of the next step was to examine if partial invariance could be established at this level. Based on examination of modification indices it was noticed that particularly two items related to self-worth seemed to be more problematic ("I often feel inferior to others" and "sometimes I feel completely worthless"). The model was respecified and the intercept for the items with the largest value of modification indices was freed across samples. This modification had the improvement of fit indices as consequence indicating that partial scalar invariance held across groups (see Table 7).

Extraversion

The first less constrained MG-CFA model of extraversion showed a quite adequate fit to the data supporting configural invariance; χ^2 (12) = 100.233, p < .001, CFI =.972, RMSEA = .066. In the next level of invariance, the metric invariance test, factor loadings were constrained to be the same in each group. Based on the fit indices of this second model it was possible to conclude that the requirements for metric invariance were met; χ^2 (17) = 101.759, p < .001, CFI = .973, RMSEA = .054. Finally, scalar invariance was evaluated by examining the fit indices of the model with constrained factor loadings and intercepts. The ΔCFI pointed out that the hypothesis of metric invariance was tenable; (χ^2 (22) = 138.864, p < .001, CFI = .963, RMSEA = .056).

Social support

First, configural invariance was evaluated for the latent factor of social support using the model with freed parameters except for the first factor loading. This baseline model exhibited

an acceptable fit to the data indicating that configural invariance was met; χ^2 (86) = 716.031, p < .001, CFI =.963, RMSEA = .066. For the next level of invariance testing, factor loadings were constrained to be equal across groups. The differences in fit indices for the more and less constrained models indicated that metric invariance was held so the next level of invariance could be tested; χ^2 (99) = 832.314, p < .001; CFI = .957; RMSEA = .066. In the last model factor loadings and intercepts were constrained to test for scalar invariance. Based on the results, it could be concluded that requirements for full scalar invariance were met; χ^2 (112) = 995.830, p < .001, CFI = .949, RMSEA = .068.

Resilience

Fit indices for the MG-CFA baseline model for resilience revealed an acceptable fit to the data; χ^2 (84) = 984.863, p < .001, CFI =.926, RMSEA = .08, and therefore, the examination of metric invariance was proceeded. To do that, a new model with constrained factor loadings was specified and changes in fit indices were analyzed. These indices and especially ΔCFI indicated that metric invariance was reached; χ^2 (94) = 1024.931, p < .001, CFI =.924, RMSEA = .077. Finally, scalar invariance was tested by constraining the intercepts of the items to be equal across both groups. Again, results of fit indices indicated that full scalar invariance was met; χ^2 (104) = 1161.060, p < .001, CFI =.914, RMSEA = .078.

Table 7

Fit indices of MG-CFA for invariance test across samples of international and German students

Model / Hypothesis	χ^2	*df*	*p*	CFI	RMSEA	Model comparison	ΔCFI
Neuroticism							
1. Configural invariance	43.121	10	< .001	.994	.044	---	---
2. Metric invariance	66.881	15	< .001	.990	.045	2-1	-0.004
3. Scalar invariance	192.947	20	< .001	.967	.072	3-2	-0.023
4. Partial Scalar invariance	113.140	19	< .001	.982	.054	4-2	-0.008
Extraversion							
1. Configural invariance	100.233	12	< .001	.972	.066	---	---
2. Metric invariance	101.759	17	< .001	.973	.054	2-1	0.001
3. Scalar invariance	138.864	22	< .001	.963	.056	3-2	-0.01
Social Support							
1. Configural invariance	716.031	86	< .001	.963	066	---	---
2. Metric invariance	832.314	99	< .001	.957	.066	2-1	-0.006
3. Scalar invariance	995.830	112	< .001	.949	.068	3-2	-0.008
Resilience							
1. Configural invariance	984.863	84	< .001	.926	.080	---	---
2. Metric invariance	1024.931	94	< .001	.924	.077	2-1	-0.002
3. Scalar invariance	1161.060	104	< .001	.914	.078	3-2	-0.01

Note. CFI = comparative fit index; RMSEA = root mean square error of approximation; ΔCFI = change in comparative fit index.

4.2.3 Latent mean differences

As described before, the test of the measurement invariance across samples of international and German students indicated that a) full scalar invariance was reached for extraversion, social support and resilience and b) partial scalar invariance was reached for neuroticism. Reaching this level of invariance across groups meaningful comparisons of latent means are possible. Based on the invariant model with constrained factor loadings and constrained intercepts, latent mean differences were estimated, after latent means in the sample of German students were set to zero. As the Table 8 indicates, and in consistency with the results of the

observed mean differences, latent means for neuroticism, extraversion and social support were significantly lower in the sample of international students than for German students (p < .001). While differences of neuroticism (d = -1.68) and extraversion (d = -1.24) showed large size effects, difference in social support showed a medium effect (d = -0.67). Results indicated that the resilience latent means between both samples did not differ significantly.

Table 8

Estimated latent mean differences of latent predictors

Latent Predictor	International students	Pooled *SD*	*t*	*p*	Effect size (*d*)
Neuroticism	-0.79	0.48	-23.16	< .001	-1.68
Extraversion	-0.81	0.64	-24.77	< .001	-1.24
Social Support	-0.37	0.55	-11.25	< .001	-0.67
Resilience	0.04	0.96	0.94	.342	0.04

Note. Latent mean values for the sample of German students were set to zero.

4.3 Predicting diagnoses of mental disorders

The aim of the next section was to analyze the role of different predictors in the development of MDD, other depressive disorder, somatoform disorder and anxiety disorder. Logistic regression analyses were conducted on each diagnosis (as outcome variables); observed variables were included as predictors. Results are presented separately for each mental disorder in the total sample including four different models. In the first model only main effects of predictors were included. In the second model, the interaction between social support and stress was added to test if according to the theory (please see 1.3.2.2), social support acts as a buffer against the negative effects of stress on mental health. The aim of the third model was to explore if the effect of predictors (and the interaction term between social support and stress) on mental disorders differed between international and German students. For that reason, interactions between the variable international/German student and each predictor were included in the model. The fourth and final model included only main effects, significant interaction terms from the third model and the theory-based interaction between social support and stress. Significant interactions were examined based on the results of this final model.

4.3.1 Major depressive disorder (MDD)

According to the results of the first model for MDD including only main effects (see Table 9), lower age, higher neuroticism scores, lower extraversion scores, lower social support and higher stress values were associated with this mental disorder. Furthermore, gender was a significant predictor of MDD. Male students were significantly more likely to screen positive for MDD while adjusting for the covariates included in the model. Importantly, the status of international student was a significant predictor of MDD.

In the second model, the interaction between social support and stress was added (see Table 9). Results did not support the hypothesis that social support acts as a buffer against the negative effects of stress. All significant main effects of predictors of the first model remained significant in the second one.

In the third model, interaction terms between predictors and the variable international/German student were added to examine differences between both samples in the effects of predictors on MDD. Results showed that none of the interactions were significant predictors of MDD which indicated that the effect of the different predictors included in the model did not differ significantly between international and German students (see Table 10).

A final model was specified excluding all non-significant interactions except for the interaction between social support and stress (see Table 10). The final results indicated that having the status of international student was a significant predictor of MDD ($p < .001$). International students were almost three times more likely to screen positively for MDD while adjusting for other covariates included in the model (adj. $OR = 2.98$). Among other demographic characteristics, lower age ($p = .008$) and being male ($p < .001$) were associated with MDD. Other significant predictors were higher neuroticism scores ($p < .001$), lower extraversion scores ($p = .002$), lower social support ($p = .01$) and higher stress levels ($p < .001$). No significant associations between resilience, the number of traumatic life events, the interaction between social support and stress and MDD were found. This final model explained between 23.9% (Cox and Snell R^2) and 49.1% (Nagelkerke R^2) of the variance in MDD.

Table 9

Logistic regression analysis on the diagnosis of MDD at T1: Model 1 and 2

	Model 1						Model 2					
					CI						CI	
Predictor	*b*	S.E. *b*	*p*	*OR*	Lower	Upper	*b*	S.E. *b*	*p*	*OR*	Lower	Upper
Gender	-0.57	0.16	< .001	0.56	0.41	0.77	-0.56	0.16	< .001	0.56	0.41	0.78
Age	-0.04	0.01	.006	0.95	0.92	0.98	-0.04	0.01	.008	0.95	0.92	0.98
Neuroticism	0.28	0.02	< .001	1.33	1.28	1.39	0.28	0.02	< .001	1.33	1.28	1.38
Extraversion	-0.07	0.02	.002	0.93	0.89	0.97	-0.07	0.02	.002	0.93	0.89	0.97
Social support	-0.01	0.007	.04	0.98	0.97	0.99	-0.02	0.009	.01	0.97	0.95	0.99
Stress	0.25	0.02	< .001	1.29	1.23	1.35	0.27	0.02	< .001	1.31	1.24	1.38
Resilience	-0.007	0.008	.33	0.99	0.97	1.00	-0.007	0.008	.38	0.99	0.97	1.00
Trauma	0.03	0.03	.22	1.03	0.97	1.10	0.04	0.03	.20	1.04	0.97	1.10
International/German	1.08	0.23	< .001	2.96	1.85	4.72	1.09	0.23	< .001	2.98	1.87	4.75
Social support*stress	---	---	---	---	---	---	0.003	0.002	.14	1.00	0.99	1.00
International/German*gender	---	---	---	---	---	---	---	---	---	---	---	---
International/German*age	---	---	---	---	---	---	---	---	---	---	---	---
International/German*neuroticism	---	---	---	---	---	---	---	---	---	---	---	---
International/German*extraversion	---	---	---	---	---	---	---	---	---	---	---	---
International/German*s. support	---	---	---	---	---	---	---	---	---	---	---	---
International/German*stress	---	---	---	---	---	---	---	---	---	---	---	---
International/German*resilience	---	---	---	---	---	---	---	---	---	---	---	---
International/German*trauma	---	---	---	---	---	---	---	---	---	---	---	---
International/German*s. support* stress	---	---	---	---	---	---	---	---	---	---	---	---

Note. Variables are centered around the mean. CI = confidence interval. Reference category for gender = male. Reference category for international/German = German. Model 1 Cox & Snell $R^2 = .238$, Nagelkerke $R^2 = .490$. Model 2 Cox & Snell $R^2 = .239$, Nagelkerke $R^2 = .491$.

Table 10

Logistic regression analysis on the diagnosis of MDD at T1: Model 3 and 4

	Model 3						Model 4					
					CI						CI	
Predictor	*b*	S.E. *b*	*p*	*OR*	Lower	Upper	*b*	S.E. *b*	*p*	*OR*	Lower	Upper
Gender	-0.71	0.19	< .001	0.48	0.33	0.71	-0.56	0.16	< .001	0.56	0.41	0.78
Age	-0.05	0.02	.007	0.94	0.90	0.98	-0.04	0.01	.008	0.95	0.92	0.98
Neuroticism	0.31	0.02	< .001	1.36	1.30	1.43	0.28	0.02	< .001	1.33	1.28	1.38
Extraversion	-0.06	0.02	.02	0.94	0.89	0.99	-0.07	0.02	.002	0.93	0.89	0.97
Social support	-0.02	0.01	.03	0.97	0.95	0.99	-0.02	0.009	.01	0.97	0.95	0.99
Stress	0.27	0.03	< .001	1.31	1.23	1.39	0.27	0.02	< .001	1.31	1.24	1.38
Resilience	-0.006	0.009	.51	0.99	0.97	1.01	-0.007	0.008	.38	0.99	0.97	1.00
Trauma	0.07	0.03	.04	1.08	1.00	1.16	0.04	0.03	.20	1.04	0.97	1.10
International/German	1.09	0.44	.01	2.97	1.23	7.16	1.09	0.23	< .001	2.98	1.87	4.75
Social support*stress	0.001	0.002	.72	1.00	0.99	1.00	0.003	0.002	.14	1.00	0.99	1.00
International/German*gender	0.45	0.36	.20	1.58	0.77	3.22	---	---	---	---	---	---
International/German*age	0.03	0.03	.35	1.03	0.96	1.11	---	---	---	---	---	---
International/German*neuroticism	-0.08	0.04	.05	0.91	0.83	1.00	---	---	---	---	---	---
International/German*extraversion	-0.01	0.05	.77	0.98	0.88	1.09	---	---	---	---	---	---
International/German*s. support	0.009	0.02	.68	1.00	0.96	1.05	---	---	---	---	---	---
International/German*stress	-0.01	0.06	.84	0.98	0.87	1.11	---	---	---	---	---	---
International/German*resilience	-0.002	0.01	.88	0.99	0.96	1.03	---	---	---	---	---	---
International/German*trauma	-0.10	0.06	.12	0.90	0.79	1.02	---	---	---	---	---	---
International/German*s. support* stress	0.002	0.004	.63	1.00	0.99	1.00	---	---	---	---	---	---

Note. Variables are centered around the mean. CI = confidence interval. Reference category for gender = male. Reference category for international/German = German. Model 3 Cox & Snell R^2 = .241, Nagelkerke R^2= .496. Model 4 Cox & Snell R^2 = .239, Nagelkerke R^2= .491.

4.3.2 Other depressive disorder

In the first specified model for the diagnosis of other depressive disorder, only main effects of predictors were included (see Table 11). According to the results, only neuroticism and extraversion were significant predictors of the diagnosis of other depressive disorder. Higher values of neuroticism and lower values of extraversion were significantly associated with this disorder while gender, age, social support, stress, resilience, the number of traumatic life events and nationality (international/German) were not significant predictors.

In the second model, main effects of predictors as well as the theory-based interaction term between social support and stress were regressed on the diagnosis of other depressive disorder (see Table 11). In this model, neuroticism and extraversion remained as significant predictors of this mental disorder. Furthermore, results indicated that the two-way interaction between social support and stress was significant.

In the third model, interaction terms between all previous predictors and the variable international/German student were added to examine significant differences in their effect between samples (see Table 12). Results indicated that neuroticism, extraversion, social support and resilience were significant predictors of the diagnosis of other depressive disorder. Stress and the two-way interaction between social support and stress remained significant. Additionally, the results showed that the effect of age differed significantly between international and German students.

In the final model, only main effects of predictors, the theory-based interaction between social support and stress as well as significant interaction term from third model were included (see Table 12). According to these final results, higher neuroticism ($p < .001$), lower extraversion ($p < .001$), lower social support ($p = .01$), higher stress ($p = .006$) and the interaction between social support and stress ($p < .001$) were significant predictors of the diagnosis of other depressive disorder when other variables here are held constant. Gender, age, resilience, traumatic life events as well as the variable international/German student were not significant predictors of this mental disorder. Additionally, the interaction term between the variable international/German student and age did not remain significant. This final model explained between 4.6% (Cox and Snell R^2) and 9.6% (Nagelkerke R^2) of the variance in other depressive disorder.

Table 11

Logistic regression analysis on the diagnosis of other depressive disorder at T1: Model 1 and 2

	Model 1						Model 2					
					CI						CI	
Predictor	*b*	S.E. *b*	*p*	*OR*	Lower	Upper	*b*	S.E. *b*	*p*	*OR*	Lower	Upper
Gender	0.04	0.13	.71	1.05	0.80	1.36	0.05	0.13	.67	1.05	0.81	1.37
Age	-0.02	0.01	.11	0.97	0.94	1.00	-0.02	0.01	.16	0.97	0.95	1.00
Neuroticism	0.06	0.01	< .001	1.07	1.03	1.10	0.06	0.01	< .001	1.06	1.03	1.09
Extraversion	-0.07	0.01	< .001	0.92	0.89	0.96	-0.07	0.01	< .001	0.92	0.89	0.96
Social support	-0.008	0.007	.20	0.99	0.97	1.00	-0.01	0.007	.01	0.98	0.97	0.99
Stress	0.03	0.02	.11	1.03	0.99	1.07	0.06	0.02	.006	1.06	1.01	1.10
Resilience	-0.01	0.006	.07	0.98	0.97	1.00	-0.01	0.006	.07	0.98	0.97	1.00
Trauma	0.04	0.02	.09	1.04	0.99	1.10	0.04	0.02	.08	1.04	0.99	1.10
International/German	-0.008	0.19	.96	0.99	0.67	1.45	-0.02	0.19	.90	0.97	0.66	1.43
Social support*stress	---	---	---	---	---	---	0.005	0.001	< .001	1.00	1.00	1.00
International/German*gender	---	---	---	---	---	---	---	---	---	---	---	---
International/German*age	---	---	---	---	---	---	---	---	---	---	---	---
International/German*neuroticism	---	---	---	---	---	---	---	---	---	---	---	---
International/German*extraversion	---	---	---	---	---	---	---	---	---	---	---	---
International/German*s. support	---	---	---	---	---	---	---	---	---	---	---	---
International/German*stress	---	---	---	---	---	---	---	---	---	---	---	---
International/German*resilience	---	---	---	---	---	---	---	---	---	---	---	---
International/German*trauma	---	---	---	---	---	---	---	---	---	---	---	---
International/German*s. support* stress	---	---	---	---	---	---	---	---	---	---	---	---

Note. Variables are centered around the mean. CI = confidence interval. Reference category for gender = male. Reference category for international/German = German; Model 1 Cox & Snell $R^2 = .041$, Nagelkerke $R^2 = .086$. Model 2 Cox & Snell $R^2 = .045$; Model 2 Nagelkerke $R^2 = .094$.

Table 12

Logistic regression analysis on the diagnosis of other depressive disorder at T1: Model 3 and 4

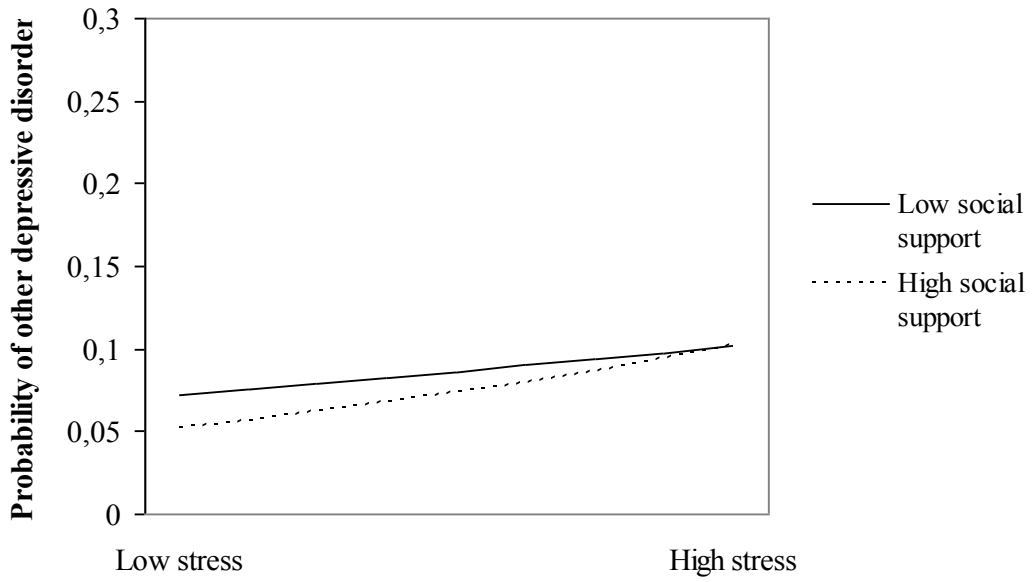
	Model 3						Model 4					
					CI						CI	
Predictor	*b*	S.E. *b*	*p*	*OR*	Lower	Upper	*b*	S.E. *b*	*p*	*OR*	Lower	Upper
Gender	0.08	0.15	.56	1.09	0.80	1.47	0.05	0.13	.69	1.05	0.80	1.37
Age	0.00	0.01	.99	1.00	0.96	1.03	-0.005	0.01	.77	0.99	0.96	1.02
Neuroticism	0.07	0.01	< .001	1.07	1.03	1.10	0.06	0.01	< .001	1.06	1.03	1.09
Extraversion	-0.07	0.02	< .001	0.92	0.89	0.96	-0.07	0.01	< .001	0.93	0.89	0.96
Social support	-0.01	0.008	.02	0.98	0.96	0.99	-0.01	0.007	.01	0.98	0.97	0.99
Stress	0.04	0.02	.07	1.04	0.99	1.09	0.05	0.02	.006	1.06	1.01	1.10
Resilience	-0.01	0.007	.04	0.98	0.97	1.00	-0.01	0.006	.08	0.98	0.97	1.00
Trauma	0.03	0.03	.31	1.03	0.96	1.10	0.04	0.02	.08	1.04	0.99	1.10
International/German	-0.16	0.38	.67	0.85	0.39	1.82	0.01	0.19	.93	1.01	0.69	1.49
Social support*stress	0.008	0.002	< .001	1.00	1.00	1.01	0.005	0.001	< .001	1.00	1.00	1.00
International/German*gender	-0.03	0.32	.90	0.96	0.51	1.81	---	---	---	---	---	---
International/German*age	-0.07	0.03	.02	0.92	0.86	0.99	-0.06	0.03	.06	0.93	0.87	1.00
International/German*neuroticism	-0.02	0.03	.48	0.97	0.90	1.05	---	---	---	---	---	---
International/German*extraversion	-0.01	0.04	.78	0.98	0.90	1.08	---	---	---	---	---	---
International/German*s. support	0.003	0.01	.84	1.00	0.97	1.03	---	---	---	---	---	---
International/German*stress	0.05	0.05	.26	1.05	0.95	1.17	---	---	---	---	---	---
International/German*resilience	0.01	0.01	.42	1.01	0.98	1.04	---	---	---	---	---	---
International/German*trauma	0.03	0.05	.52	1.03	0.92	1.16	---	---	---	---	---	---
International/German*s. support* stress	-0.004	0.003	.23	0.99	0.99	1.00	---	---	---	---	---	---

Note. Variables are centered around the mean. CI = confidence interval. Reference category for gender = male. Reference category for international/German = German. Model 3 Cox & Snell R^2 = .048, Nagelkerke R^2= .100. Model 4 Cox & Snell R^2 = .046, Nagelkerke R^2= .096.

The interaction term between the status of social support and stress was decomposed by examining simple slopes. Probabilities were plotted at high stress (one *SD* above the mean) and at low stress (one *SD* below the mean) based on the parameters of the final model (see Table 12 and Figure 6). Results indicated that when stress increased, the probabilities of having the diagnosis of other depressive disorder raised at both high and low social support. At low stress, students with high social support had a lower probability of having this diagnosis. However, at high stress, the probability was the same for both students with low and high social support.

Figure 6

Interaction term between social support and stress on the diagnosis of other depressive disorder



4.3.3 Somatoform disorder

Results of the first logistic regression model on somatoform disorder including only main effects (see Table 13) indicated that after adjusting for covariates, female gender was a significant predictor of this diagnosis. Other significant predictors that were found to be positively associated with this disorder were neuroticism, stress and traumatic life events. The

status of international student did not predict the diagnosis of somatoform disorder significantly.

In the second model, the interaction term between social support and stress was added to test the buffering effect of social support on stress (see Table 13). Results of this model did not support the hypothesis of the buffering effect of social support on this particular diagnosis.

In a third model, interaction terms between predictors as well as the interaction term between social support and stress and the variable international/German student were included to test for effect differences of predictors on somatoform disorder between samples. Results showed that only the effect of neuroticism significantly differed between international and German students.

In the final specified model only main effects and the interaction term between the variable international/German student and neuroticism along with the interaction between social support and stress were kept. Table 14 shows that the diagnosis of somatoform disorder was significantly associated at $p < .001$ with female gender, higher stress and more traumatic life events. According to the adjusted odd ratio, females were 2.3 more likely to meet diagnostic criteria for somatoform disorder compared to males. Neuroticism was also found to be a significant predictor of somatoform disorder ($p < .001$). The effect differed significantly between samples of international and German students ($p = .004$). The variables international/German student, age, social support, extraversion and resilience did not predict the diagnosis of somatoform disorder significantly. Additionally, the interaction term between social support and stress was also non-significant. This final model explained between 15.2% (Cox and Snell R^2) and 27.7% (Nagelkerke R^2) of the variance in the diagnosis of somatoform disorder.

Table 13

Logistic regression analysis on diagnosis of somatoform disorder at T1: Model 1 and 2

	Model 1						Model 2					
					CI						CI	
Predictor	*b*	S.E. *b*	*p*	*OR*	Lower	Upper	*b*	S.E. *b*	*p*	*OR*	Lower	Upper
Gender	0.83	0.14	< .001	2.29	1.71	3.06	0.83	0.14	< .001	2.29	1.71	3.06
Age	-0.02	0.01	.07	0.97	0.95	1.00	-0.02	0.01	.08	0.97	0.95	1.00
Neuroticism	0.11	0.01	< .001	1.11	1.08	1.14	0.11	0.01	< .001	1.11	1.08	1.14
Extraversion	-0.01	0.01	.34	0.98	0.94	1.01	-0.01	0.01	.35	0.98	0.94	1.01
Social support	0.009	0.007	.16	1.00	0.99	1.02	0.008	0.008	.34	1.00	0.99	1.02
Stress	0.21	0.02	< .001	1.24	1.19	1.29	0.21	0.02	< .001	1.24	1.19	1.29
Resilience	0.004	0.006	.47	1.00	0.99	1.01	0.005	0.006	.46	1.00	0.99	1.01
Trauma	0.09	0.02	< .001	1.09	1.04	1.15	0.09	0.02	< .001	1.09	1.04	1.15
International/German	0.28	0.18	.13	1.32	0.91	1.92	0.28	0.18	.13	1.32	0.91	1.92
Social support*stress	---	---	---	---	---	---	0.00	0.001	.79	1.00	0.99	1.00
International/German*gender	---	---	---	---	---	---	---	---	---	---	---	---
International/German*age	---	---	---	---	---	---	---	---	---	---	---	---
International/German*neuroticism	---	---	---	---	---	---	---	---	---	---	---	---
International/German*extraversion	---	---	---	---	---	---	---	---	---	---	---	---
International/German*s. support	---	---	---	---	---	---	---	---	---	---	---	---
International/German*stress	---	---	---	---	---	---	---	---	---	---	---	---
International/German*resilience	---	---	---	---	---	---	---	---	---	---	---	---
International/German*trauma	---	---	---	---	---	---	---	---	---	---	---	---
International/German*s. support* stress	---	---	---	---	---	---	---	---	---	---	---	---

Note. Variables are centered around the mean. CI = confidence interval. Reference category for gender = male. Reference category for international/German = German students; Model 1 Cox & Snell R^2 = .151, Nagelkerke R^2 = .275. Model 2 Cox & Snell R^2 = .151, Nagelkerke R^2= .275.

Table 14

Logistic regression analysis on diagnosis of somatoform disorder at T1: Model 3 and 4

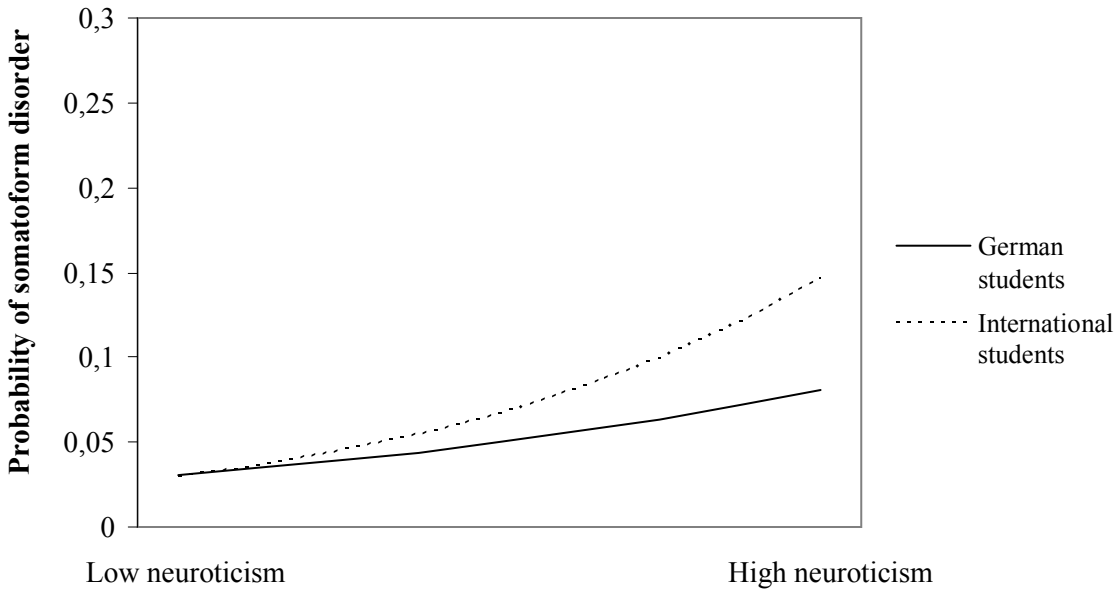
	Model 3						Model 4					
					CI						CI	
Predictor	*b*	S.E. *b*	*p*	*OR*	Lower	Upper	*b*	S.E. *b*	*p*	*OR*	Lower	Upper
Gender	0.79	0.16	< .001	2.21	1.59	3.07	0.83	0.14	< .001	2.30	1.72	3.08
Age	-0.02	0.01	.09	0.97	0.94	1.00	-0.02	0.01	.07	0.97	0.95	1.00
Neuroticism	0.09	0.01	< .001	1.10	1.06	1.13	0.09	0.01	< .001	1.10	1.07	1.13
Extraversion	-0.01	0.02	.52	0.98	0.94	1.02	-0.01	0.01	.30	0.98	0.94	1.01
Social support	0.004	0.009	.68	1.00	0.98	1.02	0.007	0.008	.41	1.00	0.99	1.02
Stress	0.22	0.02	< .001	1.25	1.19	1.30	0.22	0.02	< .001	1.24	1.19	1.29
Resilience	0.003	0.007	.67	1.00	0.98	1.01	0.005	0.006	.42	1.00	0.99	1.01
Trauma	0.08	0.03	.004	1.08	1.02	1.15	0.09	0.02	< .001	1.10	1.04	1.15
International/German	0.12	0.41	.76	1.13	0.50	2.56	0.31	0.18	.09	1.36	0.94	1.97
Social support*stress	0.001	0.002	.63	1.00	0.99	1.00	0.001	0.002	.63	1.00	0.99	1.00
International/German*gender	0.18	0.36	.61	1.20	0.58	2.47	---	---	---	---	---	---
International/German*age	0.007	0.03	.80	1.00	0.95	1.06	---	---	---	---	---	---
International/German*neuroticism	0.08	0.03	.03	1.08	1.00	1.16	0.06	0.03	.04	1.07	1.00	1.14
International/German*extraversion	-0.02	0.04	.59	0.97	0.89	1.06	---	---	---	---	---	---
International/German*s. support	0.01	0.01	.54	1.01	0.97	1.05	---	---	---	---	---	---
International/German*stress	-0.01	0.04	.79	0.98	0.89	1.08	---	---	---	---	---	---
International/German*resilience	0.01	0.01	.52	1.01	0.98	1.04	---	---	---	---	---	---
International/German*trauma	0.03	0.05	.55	1.03	0.92	1.14	---	---	---	---	---	---
International/German*s. support* stress	-0.001	0.003	.70	0.99	0.99	1.00	---	---	---	---	---	---

Note. Variables are centered around the mean. CI = confidence interval. Reference category for gender = male. Reference category for international/German = German, Model 3 Cox & Snell $R^2 = .152$, Nagelkerke $R^2 = .278$. Model 4 Cox & Snell $R^2 = .152$, Nagelkerke $R^2 = .277$.

The significant interaction between neuroticism and the variable international/German student is illustrated in Figure 7 based on the parameters from the final model. Probabilities were plotted at low neuroticism (one *SD* below the mean) and high neuroticism (one *SD* above the mean). Neuroticism was found to be a significant predictor of somatoform disorder in the sample of international students ($b = 0.16$, $p < .001$) as well as in the sample of German students ($b = 0.09$, $p < .001$). Results indicated that at low neuroticism, the probability of being diagnosed with a somatoform did not differ between international and German students. At high neuroticism, the probability of meeting diagnostic criteria for somatoform disorder increased in both samples. However, this increase was significantly higher for international students than for German students.

Figure 7

Interaction term between the variable international/German student and neuroticism on the diagnosis of somatoform disorder



4.3.4 Anxiety disorder

In the same way as for the previous mental disorders, logistic regressions on the diagnosis of anxiety disorder were conducted. The first model including only main effects of predictors indicated that higher neuroticism, higher stress and the status of international student were significantly associated with the diagnosis of anxiety disorder (see Table 15).

In the second model, the interaction term between social support and stress was added to test if, according to the literature, social support acts as a moderator of stress. Results indicated that the interaction between social support and stress was not a significant predictor of the diagnosis of anxiety disorder (see Table 15).

In the third model, interaction terms were added to test for differences between international and German students and to examine if the effect of predictors (and the effect of interaction between social support and stress) differed between both samples. Results indicated that all interaction terms were non-significant. Although the variable international/German student did not remain significant after adding the interaction terms, p value was close to significance levels ($p = .06$). All other significant predictors from the previous model remained significant (see Table 16).

A last model was specified by dropping all non-significant interactions. Only the theory-based interaction between social support and stress (although non-significant in the third model) was included (see Table 16). These results indicated that the diagnosis of anxiety disorder was significantly associated with higher neuroticism scores ($p < .001$) and higher stress levels ($p < .001$). Furthermore, the variable international/German student was a significant predictor of anxiety disorder ($p = .02$). International students were almost two times more likely to meet diagnostic criteria for this mental disorder than German students (adj. $OR = 1.98$). Gender, age, extraversion, social support, resilience and traumatic life events were not found to be significant predictors of the diagnosis of anxiety disorder. Moreover, the interaction term between social support and stress was non-significant. This final model explained between 10.1% (Cox and Snell R^2) and 32.6% (Nagelkerke R^2) of the variance in the diagnosis of anxiety disorder.

Table 15

Logistic regression analysis on diagnosis of anxiety disorder at T1: Model 1 and 2

	Model 1						Model 2					
					CI						CI	
Predictor	*b*	S.E. *b*	*p*	*OR*	Lower	Upper	*b*	S.E. *b*	*p*	*OR*	Lower	Upper
Gender	0.17	0.22	.43	1.19	0.76	1.86	0.17	0.22	.44	1.19	0.76	1.86
Age	-0.03	0.02	.14	0.97	0.93	1.01	-0.03	0.02	.13	0.96	0.93	1.01
Neuroticism	0.16	0.02	< .001	1.18	1.18	1.24	0.16	0.02	< .001	1.18	1.12	1.24
Extraversion	-0.03	0.02	.18	0.96	0.90	1.01	-0.04	0.02	.17	0.96	0.90	1.01
Social support	-0.001	0.01	.95	0.99	0.98	1.01	0.004	0.01	.80	1.00	0.97	1.03
Stress	0.27	0.03	< .001	1.31	1.24	1.40	0.27	0.03	< .001	1.31	1.23	1.39
Resilience	0.007	0.01	.47	1.00	0.98	1.02	0.007	0.01	.48	1.00	0.98	1.02
Trauma	0.05	0.03	.17	1.05	0.97	1.13	0.05	0.03	.18	1.05	0.97	1.13
International/German	0.68	0.30	.02	1.98	1.10	3.57	0.68	0.30	.02	1.98	1.10	3.58
Social support*stress	---	---	---	---	---	---	-0.001	0.002	.70	0.99	0.99	1.00
International/German*gender	---	---	---	---	---	---	---	---	---	---	---	---
International/German*age	---	---	---	---	---	---	---	---	---	---	---	---
International/German*neuroticism	---	---	---	---	---	---	---	---	---	---	---	---
International/German*extraversion	---	---	---	---	---	---	---	---	---	---	---	---
International/German*s. support	---	---	---	---	---	---	---	---	---	---	---	---
International/German*stress	---	---	---	---	---	---	---	---	---	---	---	---
International/German*resilience	---	---	---	---	---	---	---	---	---	---	---	---
International/German*trauma	---	---	---	---	---	---	---	---	---	---	---	---
International/German*s. support* stress	---	---	---	---	---	---	---	---	---	---	---	---

Note. Variables are centered around the mean. CI = confidence interval. Reference category for gender = male. Reference category for international/German = German. Model 1 Cox & Snell R^2 = .101; Model 1Nagelkerke R^2= .326. Model 2 Cox & Snell R^2 = .101; Model 2 Nagelkerke R^2 = .326.

Table 16

Logistic regression analysis on diagnosis of anxiety disorder at T1: Model 3 and 4

	Model 3						Model 4					
					CI						CI	
Predictor	*b*	S.E. *b*	*p*	*OR*	Lower	Upper	*b*	S.E. *b*	*p*	*OR*	Lower	Upper
Gender	0.29	0.28	.30	1.33	0.77	2.31	0.17	0.22	.44	1.19	0.76	1.86
Age	-0.01	0.02	.59	0.98	0.94	1.03	-0.03	0.02	.13	0.96	0.93	1.01
Neuroticism	0.16	0.02	< .001	1.17	1.11	1.24	0.16	0.02	< .001	1.18	1.12	1.24
Extraversion	-0.05	0.03	.08	0.94	0.88	1.00	-0.04	0.02	.17	0.96	0.90	1.01
Social support	0.02	0.01	.22	1.02	0.98	1.06	0.004	0.01	.80	1.00	0.97	1.03
Stress	0.27	0.03	< .001	1.32	1.22	1.41	0.27	0.03	< .001	1.31	1.23	1.39
Resilience	0.005	0.01	.68	1.00	0.98	1.10	0.007	0.01	.48	1.00	0.98	1.02
Trauma	0.06	0.04	.16	1.06	0.97	1.16	0.05	0.03	.18	1.05	0.97	1.13
International/German	1.17	0.06	.06	3.22	0.95	10.93	0.68	0.30	.02	1.98	1.10	3.58
Social support*stress	-0.003	0.003	.31	0.99	0.99	1.00	-0.001	0.002	.70	0.99	0.99	1.00
International/German*gender	-0.42	0.49	.39	0.65	0.24	1.73	---	---	---	---	---	---
International/German*age	-0.06	0.04	.17	0.93	0.85	1.02	---	---	---	---	---	---
International/German*neuroticism	0.03	0.05	.50	1.04	0.92	1.16	---	---	---	---	---	---
International/German*extraversion	0.06	0.07	.39	1.06	0.92	1.21	---	---	---	---	---	---
International/German*s. support	-0.05	0.03	.10	0.94	0.89	1.01	---	---	---	---	---	---
International/German*stress	-0.01	0.08	.89	0.98	0.84	1.16	---	---	---	---	---	---
International/German*resilience	0.004	0.02	.87	1.00	0.96	1.05	---	---	---	---	---	---
International/German*trauma	-0.04	0.08	.60	0.95	0.81	1.12	---	---	---	---	---	---
International/German*s. support* stress	0.005	0.005	.28	1.00	0.99	1.01	---	---	---	---	---	---

Note. Variables are centered around the mean. CI = confidence interval. Reference category for gender = male. Reference category for international/German = German. Model 3 Cox & Snell R^2 = .103; Model 3 Nagelkerke R^2= .333. Model 4 Cox & Snell R^2 = .101; Model 4 Nagelkerke R^2 = .326.

4.3.5 Predictors of mental disorders in the sample of international students

In addition to the previous analyses of predictors involved in the development of mental disorders, logistic regression analyses on the diagnoses of MDD, other depressive disorder, somatoform disorder and anxiety disorder were conducted to examine the role of specific variables related to the status of international student on mental disorders. Variables included in the analyses were: months being in Germany, having someone to help upon arrival in Germany, actual knowledge of the German language, number of problems related to the condition of international students (e.g. problems with visa, discrimination), homesickness, worrying about problems in the home country, frequency of seeing the family and frequency of being in contact with the family (e.g. email, phone calls). All of these predictors were included in a model controlling for predictors described in the previous analyses (i.e. gender, age, neuroticism, extraversion, social support, stress, resilience and traumatic events) and were regressed on the diagnosis of MDD, other depressive disorder, somatoform disorder and anxiety disorder. Only significant results of new variables added to the model are reported.

Major depressive disorder

According to the results of regression analysis on MDD, none of the added variables were significantly associated with this diagnosis at T1 in the sample of international students.

Other depressive disorder

Results of regression analysis on other depressive disorder revealed that being in Germany for a longer time was a significant predictor of this diagnosis; $b = 0.01$, $p = .006$. Furthermore, being more frequently in contact with the family was a significant predictor of the diagnosis of other depressive disorder; $b = 0.45$, $p = .045$.

Somatoform disorder

Results of regression analysis on the diagnosis of somatoform disorder indicated that a higher number of problems faced by international students was a significant predictor of this diagnosis; $b = 0.13$, $p = .02$.

Anxiety disorder

According to the results of regression analysis on the diagnosis of anxiety disorder, seeing the family less frequently was a significant predictor of diagnosis of anxiety disorder; $b = -0.92$, $p = .03$.

4.4 Predicting symptom severity

The instrument used in the present study for the assessment of mental disorders (PHQ) also offers the possibility to build severity scores. In consequence, multiple linear regressions on severity of depressive, somatic and anxiety symptoms at T1 were conducted including latent variables (i.e. neuroticism, extraversion, social support and resilience), observed variables (gender, age, stress, traumatic life events and international/German status) and interaction terms using a multigroup approach. Models for the latent variables of neuroticism, extraversion, social support and resilience were taken from the final model specified at 4.2.1.

Four models were tested for each outcome. The first model was specified including only main effects of predictors. In a second model, the hypothesis that social support buffers the negative effects of stress was tested by including the interaction term between stress and the latent variable of social support. In a third model, differences in the effect of predictors between international and German students were explored by calculating the interaction terms between each variable and the variable international/German student. In the final model, main effects of predictors and the theory-based interaction between social support and stress were included. Only significant interactions were reported in this final model. Finally, simple slopes of significant interactions were examined and plotted at one *SD* above and below the mean.

4.4.1 Predicting severity of depressive symptoms

The role of predictors (demographic and clinical) regarding the severity score of depressive symptoms at T1 was examined by conducting multiple linear regressions. In the first model only main effects of predictors were included (see Table 17). Results indicated that higher neuroticism, higher stress levels, more traumatic life events and lower extraversion were significantly associated with depressive symptoms. Significant predictors among demographic variables were male gender, lower age and the status of international student.

The latent variables of social support and resilience did not significantly predict depressive symptoms.

In the second, model the interaction term between social support and stress was added to test the hypothesis that social support buffers the negative effects of stress in relation to depressive symptoms. As Table 17 shows, all significant main effects from the first model remained significant in the second one. Moreover, the interaction term between social support and stress was significant, supporting the buffering hypothesis of social support in relation to depressive symptoms.

In the third model, interaction terms between predictors (also including the interaction between stress and social support) and the variable international/German student were calculated to explore if both samples differed significantly in the effects of depressive symptoms. As the results of the third model indicated (see Table 18), the two-way interaction between social support and stress as well as the interaction between stress and the variable international/German student were significant predictors of depressive symptoms. Furthermore, the three-way interaction between social support, stress and the variable international/German student also reached significance levels.

In a last step, a final model was specified including main effects of predictors. Lower order terms from the three-way significant interaction were kept in the model. As Table 18 shows, there was a significant association between depressive symptoms and being male ($p < .001$), lower age ($p < .001$), higher number of traumatic life events ($p < .001$), higher score of the latent variable of neuroticism ($p < .001$) and lower scores of the latent variable of extraversion ($p = .005$). Furthermore, the two-way interaction term between the latent variable of social support and stress and the three-way interaction between the latent variable of social support, stress and the variable international/German student were significant while adjusting for the other covariates included in this model. Because interaction terms are included in this model, main effects of stress and social support were not interpreted as such. This is because the main effect of these two predictors presented in the table are only for the reference group of German students. The latent variable resilience was not found to be a significant predictor of depressive symptoms. This final model explained 57.8% of the variance for international students and 64.8% for German students in severity of depressive symptoms.

Table 17

Regression analysis on depressive symptoms at T1: Model 1 and 2

	Model 1				Model 2			
Predictor	*b*	S.E. *b*	β	*p*	*b*	S.E. *b*	β	*p*
Gender	-0.48	0.12	-0.05	< .001	-0.48	0.12	-0.05	< .001
Age	-0.07	0.01	-0.06	< .001	-0.07	0.01	-0.06	< .001
Neuroticism	4.06	0.21	0.60	< .001	4.08	0.25	0.06	.006
Extraversion	-0.62	0.25	-0.04	.01	-0.70	0.21	-0.05	< .001
Social support	-0.22	0.14	-0.03	.13	-0.12	0.14	-0.01	.36
Stress	0.40	0.02	0.29	< .001	0.39	0.02	0.29	< .001
Resilience	0.08	0.08	0.01	.31	0.09	0.08	0.01	.24
Trauma	0.11	0.02	0.05	< .001	0.11	0.02	0.05	< .001
International/German	2.33	0.33	0.25	< .001	2.29	0.07	0.24	< .001
Social support*stress	---	---	---	---	-0.11	0.03	-0.04	.001
International/German*gender	---	---	---	---	---	---	---	---
International/German*age	---	---	---	---	---	---	---	---
International/German*neuroticism	---	---	---	---	---	---	---	---
International/German*extraversion	---	---	---	---	---	---	---	---
International/German*s. support	---	---	---	---	---	---	---	---
International/German*stress	---	---	---	---	---	---	---	---
International/German*resilience	---	---	---	---	---	---	---	---
International/German*trauma	---	---	---	---	---	---	---	---
International/German*s. support* stress	---	---	---	---	---	---	---	---

Note. Variables are centered around the mean. Reference category for gender = male; reference category for international/German = German. Model 1 international students R^2 = .569; Model 1 German students R^2 = .641. Model 2 international students R^2 = .567; Model 2 German students R^2 = .646.

Table 18

Regression analysis on depressive symptoms at T1: Model 3 and 4

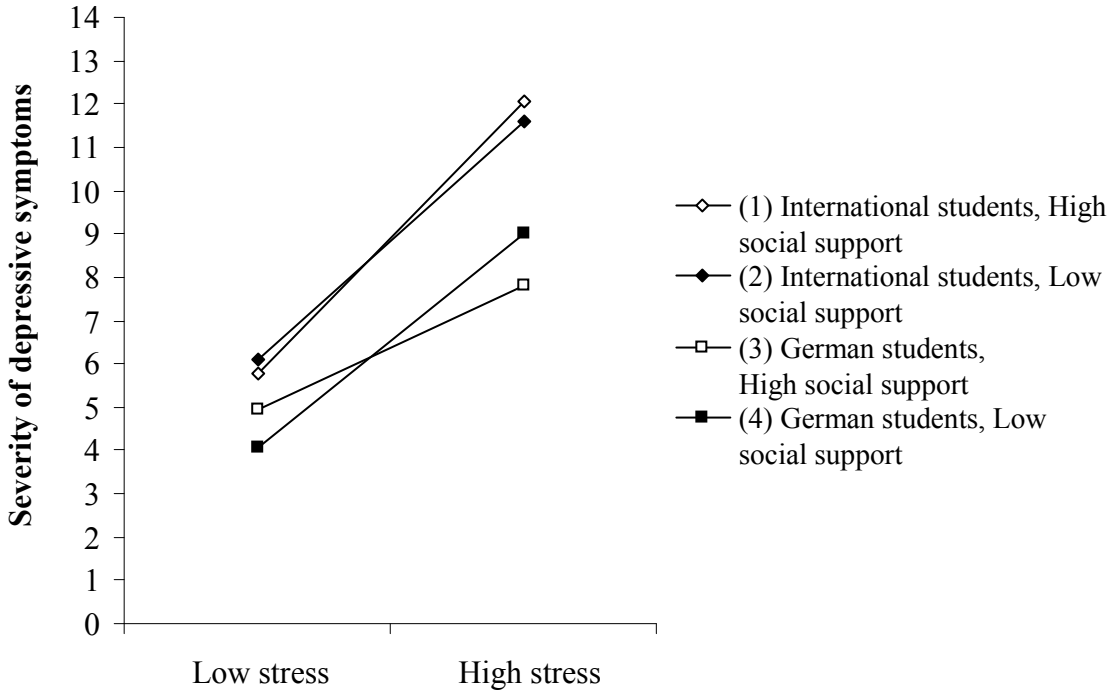
	Model 3				Model 4			
Predictor	*b*	S.E. *b*	β	*p*	*b*	S.E. *b*	β	*p*
Gender	-0.52	0.14	-0.05	< .001	-0.48	0.12	-0.05	< .001
Age	-0.06	0.01	-0.05	< .001	-0.07	0.01	-0.06	< .001
Neuroticism	4.06	0.23	0.60	< .001	4.13	0.21	0.61	< .001
Extraversion	-0.63	0.30	-0.04	.03	-0.72	0.26	-0.05	.005
Social support	-0.18	0.17	-0.02	.27	-0.13	0.16	-0.01	.43
Stress	0.36	0.02	0.26	< .001	0.36	0.02	0.26	< .001
Resilience	0.11	0.09	0.02	.18	0.11	0.08	0.02	.16
Trauma	0.12	0.03	0.05	< .001	0.11	0.02	0.05	< .001
International/German	2.78	0.61	0.29	< .001	2.41	0.33	0.25	< .001
Social support*stress	-0.16	0.04	-0.06	< .001	-0.16	0.04	-0.06	< .001
International/German*gender	0.14	0.31	0.007	.64	---	---	---	---
International/German*age	-0.05	0.03	-0.02	.10	---	---	---	---
International/German*neuroticism	0.78	0.56	0.05	.16	---	---	---	---
International/German*extraversion	-0.22	0.62	-0.007	.71	---	---	---	---
International/German*s. support	0.09	0.30	0.005	.76	-0.02	0.26	-0.001	.93
International/German*stress	0.13	0.06	0.04	.04	0.18	0.05	0.06	< .001
International/German*resilience	0.05	0.26	0.004	.84	---	---	---	---
International/German*trauma	-0.03	0.06	-0.03	.58	---	---	---	---
International/German*s. support* stress	0.22	0.07	0.04	.001	0.23	0.07	0.04	.001

Note. Variables are centered around the mean. Reference category for gender = male; reference category for international/German = German. Model 3 international students R^2 = .596; Model 3 German students R^2 = .646. Model 4 international students R^2 = .578; Model 4 German students R^2 = .648.

To decompose the three-way interaction term between social support, stress and the variable international/German student, slopes from the final model (see Table 18) were calculated separately for each sample (see Figure 8). Results indicated that in the sample of international students, the interaction between social support and stress was not significant (β = 0.06 p = .21). For international students, higher levels of stress led to higher depressive symptoms regardless of social support. On the contrary, the interaction between social support and stress in the sample of German students was found to be significant (β = -0.06, p < .001). At low stress, German students with high social support had higher values of depressive symptoms. At high stress, the severity of depressive symptoms increased for both, German students with low and high social support. However, as stress increased, German students with low social support showed higher levels of depressive symptoms than those with high social support, suggesting that for German students at high stress, social support buffered the effects of stress on depressive symptoms.

Figure 8

Interaction term between social support, stress and the variable international/German student on depressive symptoms at T1



4.4.2. Predicting severity of somatic symptoms

As for the severity of depressive symptoms, predictors of severity of somatic symptoms were examined by conducting multiple linear regressions using a multigroup approach. Observed variables (i.e. age, gender, stress and traumatic life events) and latent variables (i.e. neuroticism, extraversion, social support and resilience) were included in the models. Furthermore, the hypothesis that social support acts as a buffer against the negative effects of stress was tested. Additionally, differences in the effects of predictors between international and German students were explored.

The first regression model included only main effects of predictors on somatic symptoms (see Table 19). Results of this first model indicated that somatic symptoms were significantly associated with female gender, lower age, higher neuroticism scores, higher social support, higher stress levels and having experienced more traumatic life events while adjusting for the other covariates included in the model. Furthermore, being an international student was also a significant predictor of somatic symptoms. Latent variables of extraversion and resilience did not significantly predict somatic symptoms.

A second model was specified, now including the interaction term between social support and stress according to the hypothesis that social support acts as a buffer against the negative effects of stress (see Table 19). According to the results of this model, the interaction term between social support and stress was not a significant predictor of somatic symptoms. Significant main effects from the first model remained significant in this second one.

In a third model, the difference in the effects of predictors on somatic symptoms between international and German students was explored. The results revealed a significant difference in the effect of neuroticism on somatic symptoms between international and German students (see Table 20).

In the final model, results of non-significant interactions were dropped except for the interaction term between social support and stress (see Table 20). Results indicated that significant predictors of somatic symptoms were female gender ($p < .001$), lower age ($p = .001$), higher neuroticism scores ($p < .001$), higher stress levels ($p < .001$), more traumatic life events ($p < .001$), and being an international student ($p < .001$). Contrary to the expectations, higher social support ($p = .03$) and higher resilience ($p = .04$) were also significant predictors of somatic symptoms at T1. Extraversion and the interaction between social support and stress were not significant predictors. According to this model, the effect of neuroticism on somatic symptoms differed significantly between international and German students. This final model explained 49.1% of the variance for international students and 45.6% for German students in somatic symptoms

Table 19

Regression analysis on somatic symptoms at T1: Model 1 and 2

	Model 1				Model 2			
Predictor	*b*	S.E. *b*	β	*p*	*b*	S.E. *b*	β	*p*
Gender	1.65	0.12	0.18	< .001	1.65	0.12	0.18	< .001
Age	-0.05	0.01	-0.04	.001	-0.05	0.01	-0.04	.001
Neuroticism	2.14	0.20	0.34	< .001	2.14	0.20	0.34	< .001
Extraversion	-0.29	0.25	0.02	.25	-0.29	0.25	0.02	.25
Social support	0.30	0.15	0.03	.04	0.30	0.14	0.03	.03
Stress	0.49	0.02	0.37	< .001	0.49	0.02	0.37	< .001
Resilience	0.16	0.09	0.03	.08	0.16	0.09	0.03	.08
Trauma	0.19	0.03	0.09	< .001	0.19	0.03	0.09	< .001
International/German	0.94	0.32	0.10	.004	0.94	0.32	0.10	.004
Social support*stress	---	---	---	---	-0.002	0.03	-0.0008	.95
International/German*gender	---	---	---	---	---	---	---	---
International/German*age	---	---	---	---	---	---	---	---
International/German*neuroticism	---	---	---	---	---	---	---	---
International/German*extraversion	---	---	---	---	---	---	---	---
International/German*s. support	---	---	---	---	---	---	---	---
International/German*stress	---	---	---	---	---	---	---	---
International/German*resilience	---	---	---	---	---	---	---	---
International/German*trauma	---	---	---	---	---	---	---	---
International/German*s. support* stress	---	---	---	---	---	---	---	---

Note. Variables are centered around the mean. Reference category for gender = male; reference category for international/German = German. Model 1 international students R^2= .471; Model 1 German students R^2= .457. Model 2 international students R^2= .471; Model 2 R^2 German students = .457.

Table 20

Regression analysis on somatic symptoms at T1: Model 3 and 4

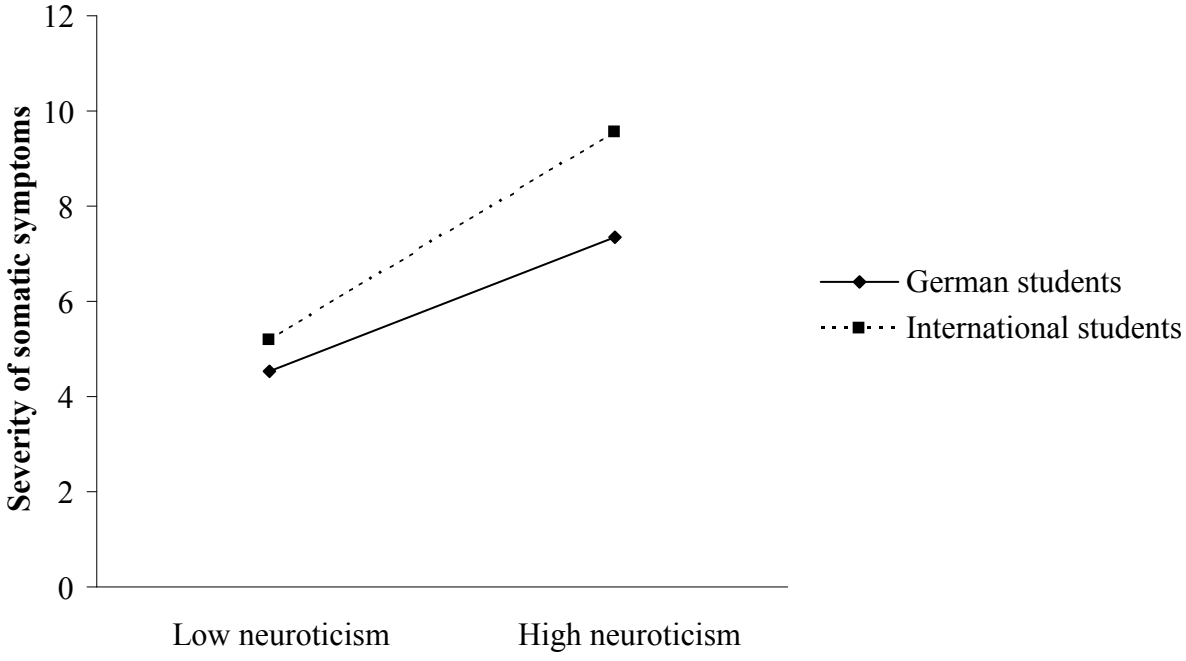
	Model 3				Model 4			
Predictor	*b*	S.E. *b*	β	*p*	*b*	S.E. *b*	β	*p*
Gender	1.64	0.14	0.18	< .001	1.65	0.12	0.18	< .001
Age	-0.05	0.01	-0.04	.002	-0.05	0.01	-0.04	.001
Neuroticism	1.92	0.21	0.30	< .001	2.01	0.19	0.31	< .001
Extraversion	-0.50	0.31	-0.03	.11	-0.38	0.25	0.02	.14
Social support	0.36	0.20	0.04	.06	0.31	0.15	0.04	.03
Stress	0.49	0.03	0.37	< .001	0.49	0.02	0.37	< .001
Resilience	0.14	0.09	0.02	.15	0.18	0.09	0.03	.04
Trauma	0.19	0.03	0.09	< .001	0.19	0.03	0.09	< .001
International/German	1.49	0.58	0.16	.01	1.44	0.39	0.16	< .001
Social support*stress	0.02	0.04	0.008	.48	0.01	0.03	0.004	.63
International/German*gender	0.09	0.31	0.005	.75	---	---	---	---
International/German*age	-0.002	0.03	-0.0009	.96	---	---	---	---
International/German*neuroticism	1.40	0.52	0.11	.008	1.08	0.34	0.08	.002
International/German*extraversion	0.20	0.60	0.007	.73	---	---	---	---
International/German*s. support	-0.08	0.30	-0.005	.77	---	---	---	---
International/German*stress	-0.01	0.06	-0.003	.88	---	---	---	---
International/German*resilience	0.26	0.26	0.02	.30	---	---	---	---
International/German*trauma	-0.006	0.06	-0.001	.93	---	---	---	---
International/German*s. support* stress	-0.03	0.07	-0.006	.67	---	---	---	---

Note. Variables are centered around the mean. Reference category for gender = male; reference category for international/German = German. Model 3 international students R^2 = .496; Model 3 German students R^2 = .455. Model 4 international students R^2 = .491; Model 4 German students R^2 = .456.

The significant two-way interaction between the variable international/German student and neuroticism was broken down by calculating simple slopes for each sample and plotting regression lines at low neuroticism (one *SD* below the mean) and high neuroticism (one *SD* above the mean) (see Figure 9). Results suggested that neuroticism was a significant predictor of the severity of somatic symptoms for both international students ($\beta = 0.49$, $p < .001$) and German students ($\beta = 0.31$, $p < .001$). Higher scores of neuroticism led to higher severity of somatic symptoms. However, as neuroticism increased, international students showed higher levels of somatic symptoms than German students.

Figure 9

Interaction term between neuroticism and the variable international/German student on somatic symptoms at T1



4.4.3 Predicting severity of anxiety symptoms

According to the results of the first regression model including only main effects (see Table 21), significant predictors of anxiety symptoms were female gender, lower age, higher neuroticism scores, higher stress levels and more traumatic life events. Furthermore, the status of international student was also found to be a significant predictor of anxiety symptoms when controlling for covariates included in the model.

In a second step, the interaction between social support and stress was added to the model to test if social support moderates the association between stress and anxiety symptoms. The results presented in Table 21 indicate that this interaction was not significant. All significant predictors in the first model remained significant in the second one.

In a third step, the differences between international and German students in the effect of predictors included in the second model were explored by calculating the interaction terms between these variables and the variable international/German student. Results indicated that only the interaction term between age and the variable international/German was significant, suggesting that the effect of age on anxiety symptoms differed between international and German students (see Table 22).

Finally, in the last model, only main effects of predictors, the theory-based interaction between social support and stress as well as the significant interaction between age and the variable international/German student were included (see Table 22). Results indicated that significant predictors of anxiety symptoms at T1 were female gender ($p = .002$), higher values of the latent factor neuroticism ($p < .001$), higher stress scores ($p < .001$), more traumatic life events ($p = .001$) and the status of international student ($p < .001$). The interaction between age and the variable international/German student was also significant ($p = .005$). The latent factors of extraversion, social support and resilience as well as the interaction between social support and stress were not found to be significant predictors of anxiety symptoms. Overall, this final model explained 48.8% of the variance in the sample of international students and 50.2% in the sample of German students.

Table 21

Regression analysis on anxiety symptoms at T1: Model 1 and 2

	Model 1				Model 2			
Predictor	*b*	S.E. *b*	β	*p*	*b*	S.E. *b*	β	*p*
Gender	0.33	0.10	0.04	.002	0.33	0.10	0.04	.002
Age	-0.03	0.01	-0.03	.004	-0.03	0.01	-0.03	.004
Neuroticism	2.82	0.17	0.56	< .001	2.83	0.17	0.56	< .001
Extraversion	0.32	0.20	0.03	.12	0.31	0.20	0.02	.12
Social support	0.17	0.10	0.02	.09	0.18	0.10	0.02	.07
Stress	0.31	0.02	0.29	< .001	0.31	0.02	0.29	< .001
Resilience	0.10	0.07	0.02	.16	0.10	0.07	0.02	.15
Trauma	0.07	0.02	0.04	.001	0.07	0.02	0.04	.001
International/German	2.34	0.25	0.33	< .001	2.33	0.25	0.33	< .001
Social support*stress	---	---	---	---	-0.004	0.03	-0.0003	.90
International/German*gender	---	---	---	---	---	---	---	---
International/German*age	---	---	---	---	---	---	---	---
International/German*neuroticism	---	---	---	---	---	---	---	---
International/German*extraversion	---	---	---	---	---	---	---	---
International/German*s. support	---	---	---	---	---	---	---	---
International/German*stress	---	---	---	---	---	---	---	---
International/German*resilience	---	---	---	---	---	---	---	---
International/German*trauma	---	---	---	---	---	---	---	---
International/German*s. support* stress	---	---	---	---	---	---	---	---

Note. Variables are centered around the mean. Reference category for gender = male; reference category for international/German = German; Model 1 international students R^2= .498; Model 1 German students R^2= .487. Model 2 international students R^2= .498; Model 2 R^2 German students = .487.

Table 22

Regression analysis on anxiety symptoms at T1: Model 3 and 4

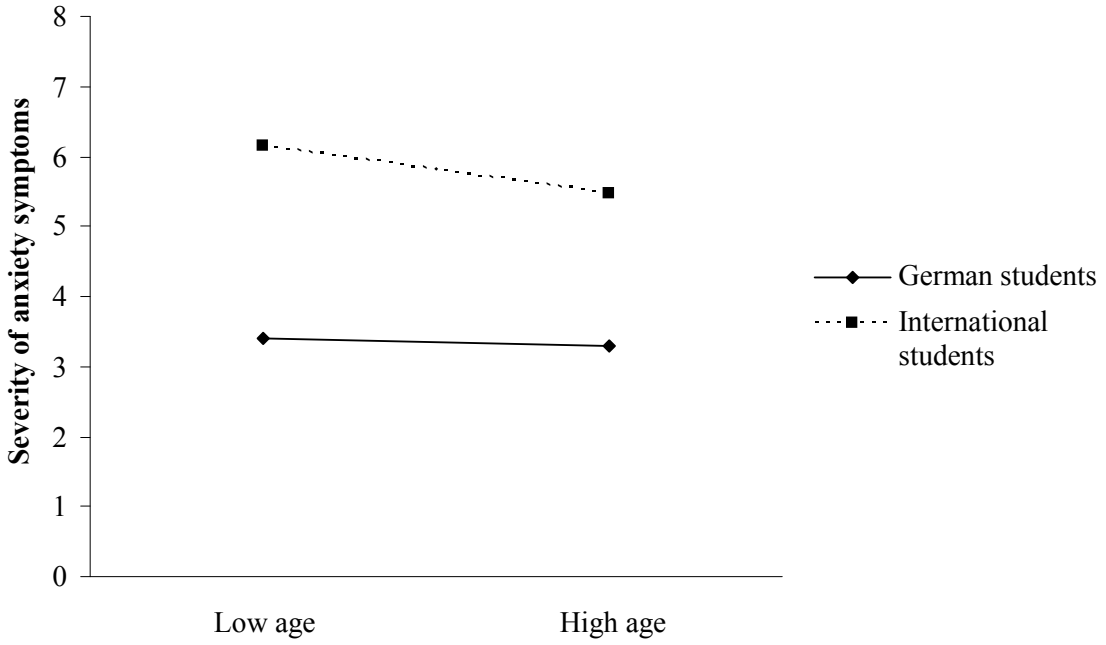
	Model 3				Model 4			
Predictor	*b*	S.E. *b*	β	*p*	*b*	S.E. *b*	β	*p*
Gender	0.35	0.12	0.04	.004	0.32	0.10	0.04	.002
Age	-0.01	0.01	-0.01	.30	-0.01	0.01	-0.01	.29
Neuroticism	2.82	0.19	0.56	< .001	2.85	0.17	0.56	< .001
Extraversion	0.19	0.25	0.01	.43	0.35	0.20	0.03	.08
Social support	0.32	0.13	0.05	.01	0.17	0.10	0.02	.09
Stress	0.30	0.02	0.28	< .001	0.31	0.02	0.29	< .001
Resilience	0.13	0.08	0.03	.10	0.10	0.07	0.02	.16
Trauma	0.08	0.02	0.05	.003	0.07	0.02	0.04	.001
International/German	2.60	0.43	0.37	< .001	2.45	0.25	0.34	< .001
Social support*stress	-0.008	0.03	-0.004	.80	-0.006	0.02	-0.003	.78
International/German*gender	-0.10	0.25	-0.007	.67	---	---	---	---
International/German*age	-0.06	0.02	-0.03	.005	-0.06	0.02	-0.03	.006
International/German*neuroticism	0.23	0.39	0.02	.55	---	---	---	---
International/German*extraversion	0.18	0.47	0.008	.69	---	---	---	---
International/German*s. support	-0.36	0.21	-0.02	.08	---	---	---	---
International/German*stress	0.02	0.04	0.009	.53	---	---	---	---
International/German*resilience	-0.07	0.20	-0.009	.72	---	---	---	---
International/German*trauma	-0.01	0.05	-0.003	.84	---	---	---	---
International/German*s. support* stress	0.03	0.04	0.008	.42	---	---	---	---

Note. Variables are centered around the mean. Reference category for gender = male; reference category for international/German = German; Model 3 international students R^2 = .511; Model 3 German students R^2 = .488. Model 4 international students R^2 = .502; Model 4 German students R^2 = .488.

The significant two-way interaction between age and the variable international/German student indicated that the effect of age on anxiety symptoms differed between these two groups. For German students, age was not found to be a significant predictor of anxiety (β = -.01, p = .29). On the contrary, for international students, lower age was a significant predictor of anxiety symptoms (β = -.08, p < .001). To visualize this interaction, simple slopes were plotted at high age (one *SD* above the mean) and low age (one *SD* below the mean) for both samples (see Figure 10).

Figure 10

Interaction term between age and the variable international/German student on anxiety symptoms at T1



4.4.4 Predictors of symptom severity in the sample of international students

Additional regression models on the severity of depressive, somatic and anxiety symptoms were conducted to test the role of specific predictors associated to the status of international student. New predictors included in the analyses were: months being in Germany, having someone to help them upon arrival in Germany, actual knowledge of the German language, number of problems related to the condition of international student (e.g. problems with visa,

discrimination), homesickness, worrying about problems in the home country, frequency of seeing the family, and frequency of being in contact with the family (e.g. email, phone calls). These predictors were controlled for the variables included in the previous analyses (gender, age, latent factors of neuroticism, extraversion, social support, and resilience in addition to stress and traumatic events). Only significant results of new variables added to the model will be reported.

Severity of depressive symptoms

The results indicated that none of these added variables were significantly associated with depressive symptoms at T1 in the sample of international students.

Severity of somatic symptoms

Results of regression analysis on somatic symptoms showed that higher number of problems faced by international students ($\beta = 0.07$, $p = .02$) and higher levels of homesickness ($\beta = 0.07$, $p = .02$) were associated with somatic symptoms in this sample.

Anxiety symptoms

Having more problems related to the status of international student was significantly associated with anxiety symptoms ($\beta = 0.07$, $p = .02$).

4.5 Predicting the course of symptom severity

After describing section the role of different predictors in the development of depressive, somatic and anxiety symptomatic in the previous, the results of multiple linear regressions on depressive, somatic and anxiety symptoms at T2 are presented next to evaluate the role that predictors play in the course of the symptomatology between T1 and T2. Regression analyses were conducted including latent variables (i.e. neuroticism, extraversion, social support, resilience) and all of the predictors included in regression analyses at T1. Furthermore, variables were controlled for symptom severity at T1. Stress levels at T2 and positive and negative life experiences between T1 and T2 were also added to the models. All data available was taken into account (including missing data from students who completed the survey only at T1). A total of three models were specified for each outcome variable. The first model included only main effects of predictors. In the second model, differences between

international and German students in the effects of these predictors on the outcome variables were explored. In the final model, only main effects of predictors and significant interactions were kept. Finally, simple slopes were analyzed for significant interactions.

4.5.1 Predicting the course of depressive symptoms

In the first model, main effects of predictors on depressive symptoms at T2 were computed (see Table 23). The results indicated that depressive symptoms at T1, stress levels at T2 and negative life experiences were positively associated to depressive symptoms at T2 while adjusting for other covariates. Furthermore, stress levels at T1 and positive life experiences between T1 and T2 were negatively correlated to the outcome variable. Other predictors included in the model did not reach significance level.

In the second model, differences in the effects of predictors on depressive symptoms at T2 were explored by computing interaction terms between all predictors and the variable international/German student (see Table 23). Only the difference in the effect of neuroticism between samples was found to be significant.

The third model included only main effects of predictors as well as the significant interaction term from the second model. Table 24 shows the results of this second model and indicates that significant predictors of depressive symptoms at T2 were lower stress levels at T1 (p = .04), more severe depressive symptoms at T1 ($p < .001$), higher stress levels at T2 ($p < .001$), higher scores of negative life experiences (p = .001) and lower scores of positive life experiences (p = .002). In this third model, the interaction between the variable international/German student and the latent factor of neuroticism did not remain significant. The latent factors neuroticism, extraversion, social support and resilience as well as gender, age, the variable international/German student and traumatic life events did not predict depressive symptoms at T2. Overall, this final model explained 54.7% of the variance in the sample of international students and 54.3 % in the sample of German students.

Table 23

Regression analysis on depressive symptoms at T2: Model 1 and 2

	Model 1				Model 2			
Predictor	*b*	S.E. *b*	β	*p*	*b*	S.E. *b*	β	*p*
Gender	0.37	0.33	0.03	.26	0.42	0.34	0.04	.21
Age	-0.06	0.03	-0.05	.08	-0.04	0.04	-0.03	.26
Neuroticism	0.14	0.56	0.02	.79	0.62	0.62	0.08	.31
Extraversion	-0.15	0.64	-0.01	.80	0.02	0.81	0.001	.97
Social support	-0.32	0.41	-0.03	.43	-0.69	0.51	-0.08	.17
Resilience	-0.38	0.23	-0.07	.10	-0.42	0.26	-0.07	.11
Trauma	0.05	0.08	0.02	.52	0.09	0.10	0.04	.37
Stress T1	-0.16	0.07	-0.11	.03	-0.24	0.08	-0.16	.004
Depression T1	0.37	0.06	0.35	< .001	0.32	0.06	0.30	< .001
Stress T2	0.62	0.07	0.40	< .001	0.64	0.08	0.42	< .001
Negative life experiences	0.12	0.03	0.16	.002	0.13	0.03	0.17	< .001
Positive life experiences	-0.07	0.02	-0.07	.003	-0.06	0.02	-0.06	.03
International/German	-0.44	0.81	-0.04	.58	-1.82	1.73	-0.18	.29
International/German*gender	---	---	---	---	-0.19	0.93	-0.009	.83
International/German*age	---	---	---	---	-0.07	0.08	-0.03	.38
International/German*neuroticism	---	---	---	---	-3.62	1.73	-0.26	.03
International/German*extraversion	---	---	---	---	-0.009	1.53	-0.0003	.99
International/German*social support	---	---	---	---	1.12	0.86	0.06	.18
International/German*resilience	---	---	---	---	-0.36	0.69	-0.03	.60
International/German* trauma	---	---	---	---	-0.14	0.17	-0.03	.41
International/German*Stress T1	---	---	---	---	0.36	0.20	0.12	.07
International/German*depression T1	---	---	---	---	0.13	0.14	0.06	.34
International/German*Stress T2	---	---	---	---	-0.09	0.15	-0.02	.53
International/German*Negative life experiences	---	---	---	---	-0.02	0.08	-0.01	.81
International/German*Positive life experiences	---	---	---	---	-0.11	0.06	-0.05	.07

Note. Variables are centered around the mean. Model 1 international students R^2 = .643, Model 1 German students R^2 = .538. Model 2 international students R^2 = .695, Model 2 German students R^2 = .543.

Table 24

Regression analysis on depressive symptoms at T2: Model 3

	Model 3			
Predictor	*b*	S.E. *b*	β	*p*
Gender	0.39	0.33	0.04	.23
Age	-0.06	0.03	-0.05	.07
Neuroticism	0.19	0.56	0.02	.72
Extraversion	-0.06	0.64	-0.004	.92
Social support	-0.34	0.41	-0.04	.39
Resilience	-0.44	0.24	-0.08	.07
Trauma	0.04	0.08	0.01	.61
Stress T1	-0.15	0.07	-0.10	.04
Depression T1	0.37	0.06	0.35	< .001
Stress T2	0.61	0.07	0.39	< .001
Negative life experiences	0.12	0.03	0.16	.001
Positive life experiences	-0.08	0.02	-0.08	.002
International/German	-1.17	0.95	-0.12	.21
International/German*gender	---	---	---	---
International/German*age	---	---	---	---
International/German*neuroticism	-1.33	0.82	-0.09	.10
International/German*extraversion	---	---	---	---
International/German*social support	---	---	---	---
International/German*resilience	---	---	---	---
International/German* trauma	---	---	---	---
International/German*stress T1	---	---	---	---
International/German*depressive T1	---	---	---	---
International/German*stress T2	---	---	---	---
International/German*negative life experiences	---	---	---	---
International/German*positive life experiences	---	---	---	---

Note. Variables are centered around the mean. Model 3 international students R^2 = .654; Model 3 German students R^2 = .538.

4.5.2 Predicting the course of somatic symptoms

In the first model, only main effects of predictors on somatic symptoms at T2 are presented (see Table 25). The results showed that female gender, lower scores of neuroticism at T1, higher scores of somatic symptoms at T1, higher stress levels at T2 and higher scores of negative life experiences were significant predictors of somatic scores at T2 when controlling for other covariates. Other predictors included in the model were not found to predict somatic symptoms at T2.

In a second model, interaction terms between all predictors and the variable international/German student were calculated to explore if the effect of these variables differed between samples (see Table 25). The results indicated that only the effect of traumatic life events differed significantly between international and German students.

In a third model, only main effects and significant interaction terms are reported (see Table 26). According to this final model, female gender (p = .002), lower scores of the latent factor neuroticism at T1 (p = .04), more somatic symptoms at T1 (p < .001), higher stress levels at T2 (p < .001) and higher scores of negative life experiences (p = .001) were significant predictors of somatic symptoms at T2. Although the effect of the number of traumatic life events differed significantly between international and German students, simple slopes analyses showed that traumatic life events were not significantly associated with somatic symptoms at T2 either for international students (β = -.08, p = .12), or for Germans (β = .05, p = .23). Age, stress levels at T1, positive life experiences, the variable international/German student and the latent variables of extraversion, social support and resilience were not significant predictors of somatic symptoms at T2. Overall, this final model explained 62.6% of the variance in the sample of international students and 55.8 % in the sample of German students.

Table 25

Regression analysis on somatic symptoms at T2: Model 1 and 2

	Model 1				Model 2			
Predictor	*b*	S.E. *b*	β	*p*	*b*	S.E. *b*	β	*p*
Gender	0.90	0.28	0.10	.001	0.90	0.28	0.10	.002
Age	-0.03	0.04	-0.02	.38	-0.06	0.05	-0.05	.24
Neuroticism	-0.82	0.41	-0.12	.04	-0.40	0.41	-0.06	.33
Extraversion	-0.68	0.46	-0.05	.14	-0.27	0.56	-0.02	.63
Social support	-0.13	0.30	-0.01	.65	-0.42	0.39	-0.05	.27
Resilience	-0.07	0.18	-0.01	.69	0.09	0.19	0.01	.62
Trauma	0.01	0.07	0.005	.83	0.13	0.09	0.06	.14
Stress T1	-0.10	0.07	-0.07	.12	-0.08	0.08	-0.06	.31
S. Symptoms T1	0.53	0.04	0.51	< .001	0.49	0.04	0.48	< .001
Stress T2	0.47	0.07	0.33	< .001	0.36	0.08	0.25	< .001
Negative life experiences	0.10	0.03	0.14	.002	0.12	0.03	0.17	.001
Positive life experiences	-0.02	0.02	-0.02	.33	-0.04	0.02	-0.04	.12
International/German	-0.89	0.61	-0.09	.14	-1.68	1.28	-0.18	.19
International/German*gender	---	---	---	---	0.02	0.82	0.001	.98
International/German*age	---	---	---	---	0.11	0.09	0.05	.21
International/German*neuroticism	---	---	---	---	-1.99	1.43	-0.15	.16
International/German*extraversion	---	---	---	---	-0.31	1.01	-0.01	.75
International/German*social support	---	---	---	---	0.52	0.63	0.03	.41
International/German*resilience	---	---	---	---	-0.92	0.48	-0.09	.05
International/German*trauma	---	---	---	---	-0.42	0.17	-0.10	.01
International/German*stress T1	---	---	---	---	-0.05	0.14	-0.01	.71
International/German*S. Symptoms T1	---	---	---	---	0.15	0.10	0.07	.13
International/German*stress T2	---	---	---	---	0.28	0.16	0.09	.08
International/German*negative life experiences	---	---	---	---	-0.02	0.06	-0.01	.65
International/German*positive life experiences	---	---	---	---	0.06	0.06	0.03	.29

Note. Variables are centered around the mean. Model 1 international students R^2 = .634; Model 1 German students R^2 = .549. Model 2 international students R^2 = .719; Model 2 German students R^2 = .542.

Table 26

Regression analysis on somatic symptoms at T2: Model 3

	Model 3			
Predictor	*b*	S.E. *b*	β	*p*
Gender	0.86	.28	0.09	.002
Age	-0.04	0.04	-0.03	.38
Neuroticism	-0.85	0.41	-0.13	.04
Extraversion	-0.54	0.46	-0.04	.24
Social support	-0.20	0.30	-0.02	.49
Resilience	-0.10	0.18	-0.02	.56
Trauma	0.10	0.08	0.05	.23
Stress T1	-0.10	0.06	-0.07	.12
Somatic symptoms T1	0.53	0.04	0.51	< .001
Stress T2	0.47	0.07	0.33	< .001
Negative life experiences	0.10	0.03	0.14	.001
Positive life experiences	-0.02	0.02	-0.02	.35
International/German	-0.71	0.61	-0.07	.24
International/German*gender	---	---	---	---
International/German*age	---	---	---	---
International/German*neuroticism	---	---	---	---
International/German*extraversion	---	---	---	---
International/German*social support	---	---	---	---
International/German*resilience	---	---	---	---
International/German* trauma	-0.27	0.12	-0.06	.03
International/German*stress T1	---	---	---	---
International/German*s. symptoms T1	---	---	---	---
International/German*stress T2	---	---	---	---
International/German*negative life experiences	---	---	---	---
International/German*positive life experiences	---	---	---	---

Note. Variables are centered around the mean. Model 3 international students R^2 = .626; Model 3 German students R^2 = .558.

4.5.3 Predicting the course of anxiety symptoms

According to the first model which included only main effects of predictors (see Table 27), female gender, lower age, anxiety symptoms at T1, lower stress levels at T1, higher stress levels at T2 and higher scores of negative life experiences were significant predictors of anxiety symptoms at T2 while adjusting for other variables in the model.

In the second model, interaction terms between predictors and the variable international/German student were computed to examine differences between samples in the effects of predictors on anxiety symptoms at T2 (see Table 27). The results indicated that only the effect of age differed significantly between samples.

In the final model, main effects of predictors were included as well as the significant interaction between age and the variable international/German student (see Table 28). According to the results, significant predictors of anxiety symptoms at T2 were female gender ($p = .04$), lower stress at T1 ($p = .02$), higher stress levels at T2 ($p < .001$), more severe anxiety symptoms at T1 ($p < .001$) and higher scores of negative life experiences ($p = .007$). The latent factors of neuroticism, extraversion, social support and resilience did not reach significance level. Traumatic life events, positive life experiences and the international student status were not predictors of anxiety symptoms at T2. This final model explained 61.7% of the variance in the sample of international students and 42.7% in the sample of German students in the severity of anxiety symptoms at T2.

Table 27

Regression analysis on anxiety symptoms at T2: Model 1 and 2

	Model 1				Model 2			
Predictor	*b*	S.E. *b*	β	*p*	*b*	S.E. *b*	β	*p*
Gender	0.47	0.23	0.06	.04	0.69	0.25	0.09	.007
Age	-0.05	0.03	-0.06	.05	-0.01	0.03	-0.01	.63
Neuroticism	0.07	0.37	0.01	.84	0.37	0.43	0.07	.38
Extraversion	-0.07	0.42	-0.006	.86	0.24	0.53	0.02	.64
Social support	0.06	0.28	0.009	.81	-0.30	0.37	-0.04	.41
Resilience	-0.16	0.17	-0.04	.33	-0.21	0.18	-0.05	.25
Trauma	0.06	0.05	0.03	.23	0.07	0.07	0.04	.36
Stress T1	-0.11	0.05	-0.10	.03	-0.11	0.06	-0.10	.07
Anxiety T1	0.29	0.04	0.29	< .001	0.25	0.05	0.25	< .001
Stress T2	0.48	0.04	0.43	< .001	0.47	0.07	0.42	< .001
Negative life experiences	0.06	0.02	0.11	.004	0.06	0.02	0.11	.01
Positive life experiences	-0.02	0.02	-0.02	.17	-0.02	0.02	-0.02	.40
International/German	0.20	0.53	0.02	.70	0.10	0.89	0.01	.90
International/German*gender	---	---	---	---	-0.70	0.49	-0.05	.15
International/German*age	---	---	---	---	-0.15	0.06	-0.09	.02
International/German*neuroticism	---	---	---	---	-1.55	0.93	-0.15	.09
International/German*extraversion	---	---	---	---	-0.37	0.96	-0.01	.69
International/German*social support	---	---	---	---	0.80	0.50	0.06	.11
International/German*resilience	---	---	---	---	-0.06	0.43	-0.007	.88
International/German* trauma	---	---	---	---	0.01	0.11	0.003	.86
International/German*stress T1	---	---	---	---	0.009	0.10	0.004	.93
International/German*anxiety T1	---	---	---	---	0.12	0.10	0.06	.21
International/German*stress T2	---	---	---	---	0.03	0.10	0.01	.74
International/German*negative life experiences	---	---	---	---	-0.004	0.04	-0.003	.93
International/German*positive life experiences	---	---	---	---	-0.05	0.04	-0.03	.22

Note. Variables are centered around the mean. Model 1 international students R^2 = .594; Model 1 German students R^2 = .428. Model 2 international students R^2 = .632; Model 2 German students R^2 = .443.

Table 28

Regression analysis on anxiety symptoms at T2: Model 3

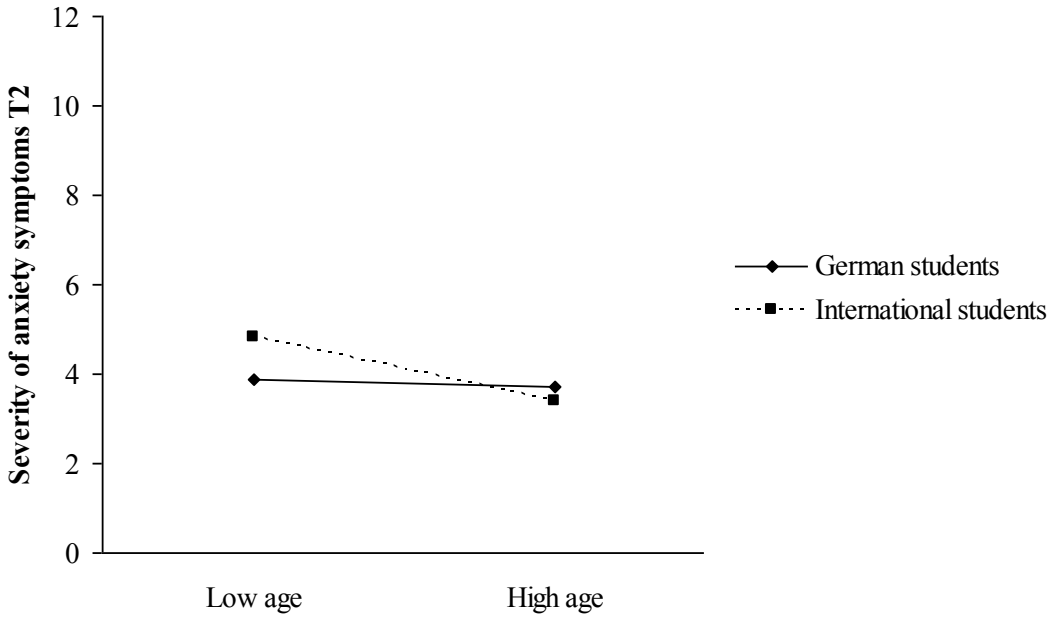
	Model 3			
Predictor	*b*	S.E. *b*	β	*p*
Gender	0.46	0.22	0.06	.04
Age	-0.01	0.03	-0.01	.54
Neuroticism	0.14	0.38	0.02	.71
Extraversion	-0.07	0.42	-0.006	.86
Social support	0.08	0.27	0.01	.76
Resilience	-0.15	0.17	-0.03	.35
Trauma	0.08	0.05	0.05	.15
Stress T1	-0.11	0.05	-0.10	.02
Anxiety T1	0.28	0.04	0.28	< .001
Stress T2	0.48	0.05	0.43	< .001
Negative life experiences	0.05	0.02	0.09	.007
Positive life experiences	-0.02	0.02	-0.02	.15
International/German	0.33	0.52	0.04	.53
International/German*gender	---	---	---	---
International/German*age	-0.14	0.05	-0.08	.01
International/German*neuroticism	---	---	---	---
International/German*extraversion	---	---	---	---
International/German*social support	---	---	---	---
International/German*resilience	---	---	---	---
International/German* trauma	---	---	---	---
International/German*stress T1	---	---	---	---
International/German*anxiety T1	---	---	---	---
International/German*stress T2	---	---	---	---
International/German*negative life	---	---	---	---
International/German*positive life	---	---	---	---

Note. Variables are centered around the mean. Model 3 international students R^2 = .617; Model 3 German students R^2 = .427.

Simple slopes were computed for the significant interaction between the variable international/German student and age. These analyses revealed that age was a significant predictor for international students (β = -.20, p = .002) but not for German students (β = -.02, p = .54). This significant interaction was plotted in Figure 11 which shows that as age increased, international students had lower anxiety symptoms at T2. In contrast, in the sample of German students, age was not significantly associated with the severity of symptoms at T2.

Figure 11

Interaction term between age and the variable international/German student on anxiety symptoms at T2



5 Discussion

Over the last decades the number of students who decided to study abroad has increased dramatically, with Germany being the third major destination for international students in the world (OECD, 2011). Although it has repeatedly been suggested that international students may be at high risk for the development of mental disorders, few studies have examined the mental health of this population. Likewise, the literature that deeply examines the factors that determine or influence the mental well-being of international students is extremely scarce. Furthermore, the few studies that have attempted to address this topic contain several limitations. In fact, concerning these studies usually only a few potential risk or protective factors were examined, the number of students including included were few or only one particular group of international students (from one specific country) were evaluated. Another draw-back is that studies addressing this topic rarely include a reference group of domestic students.

The present study attempted to address these problems. In an effort to include a large number of students, international students were recruited from two universities of great renown in Germany. Furthermore, a large control group of German students was included to examine the possible differences between the host-country nationals and international students. The study included both a cross-sectional (T1) and a longitudinal (T2) design. For T1, an online survey was developed to address important socio-demographic information as well as information of the current situation and mental health of the students. A measurement instrument for both the assessment of common mental disorders (i.e. major depressive disorder, other depressive disorder, somatoform disorder and anxiety disorder) and the severity of depressive, somatic and anxiety symptoms was included.

Importantly, differences in the prevalence rates and symptom severity between international and German students were examined. Higher prevalence rates and more severe symptoms among international students were expected.

Furthermore, the role of potential predictors of both the development of mental disorders and of the severity of symptoms was examined, including neuroticism, extraversion, social support, stress, resilience and traumatic life events as well as demographic characteristics. Differences between international and German students in the scores of these variables, along with differences in their effect on mental disorders and on the severity of symptoms, were also explored. While lower social support and higher stress levels among international

students were hypothesized, differences between international and German students in the scores of other predictors were analyzed in an explorative manner.

For the analyses of predictors of mental disorders observed variables were used. For analyses of the severity of symptoms, the psychological constructs of neuroticism, extraversion, social support and resilience were included as latent variables using structural equation modeling. It was hypothesized that the status of international students, higher neuroticism, higher stress levels, more traumatic life events, lower social support and lower resilience would be significant predictors of all outcome variables at T1. Explorative analysis of other variables and differences in the effect of predictors between international and German students was employed.

Also, measurement invariance across samples was tested for the latent constructs included in the study to assure that the measurement instruments were measuring the same psychological constructs in the same way across all samples. This is also an advantage over previous studies due to the fact that differences between groups can only be meaningfully interpreted when measurement invariance holds true.

For the follow-up study, a new survey was developed to assess mental disorders and symptoms severity, actual stress levels as well as negative and positive life experiences between measurements (T1 and T2). Demographic information was also included.

One point of particular interest was to examine the course of depressive, somatic and anxiety symptoms and associated significant predictors. It was expected that higher current stress levels, more negative life experiences and less positive life experiences would be significant predictors of higher symptom severity at T2. The effects of other predictors, as well as differences between international and German students in their effect on the outcome variables, were explored. Because the analyses were conducted using structural equation modeling, data from the students who did not participate at follow-up was also included.

In the following section, the results will be summarized and discussed in consideration of current literature. The methodological limitations and strengths of the present study, as well as prospects for future research, will be discussed in detail.

5.1 Prevalence rates of mental disorders and symptom severity at T1

A first objective of the present study was to establish the prevalence rates for MDD, other depressive disorder, somatoform disorder and anxiety disorder among university students. The results showed that mental disorders were very common among both, international and German students. The analyses indicated that at T1, 28.6% of the students (29.5% of international students and 28.3% of German students) met diagnostic criteria for at least one of the four diagnoses assessed in the present study (i.e. MDD, other depressive disorder, somatoform disorder or anxiety disorder). In other words, more than a quarter of students met the diagnosis of at least one mental disorder.

Comparisons between the prevalence rates obtained in this research and the results from other studies are not easy to interpret mostly due to methodological aspects. For example, differences in the prevalence rates between studies may be influenced by the use of different measurement instruments or time frames. Furthermore, characteristics of the sample may play an important role in the obtained prevalence rates.

However, the alarmingly high prevalence rates that international and German students reported are comparable to the results from the study conducted by Bailer et al. (2008). They examined the prevalence rates of mental disorders among students attending a German university by also using the PHQ as a measurement instrument. The authors found that 22.7% of students met the diagnostic criteria for at least one mental disorder. Interestingly, in the present study, the prevalence rates of at least one mental disorder were higher than the ones in the study of Bailer at al. (2008), especially when taking into account that the present study included a fewer number of diagnoses.

5.1.1 Major depressive disorder, other depressive disorder and depressive symptoms

The results of this study confirmed that depressive disorders are highly prevalent. The prevalence rates in the total sample revealed that 10.4% of the students screened positively for MDD and 10% for other depressive disorder. More specifically, the results showed that 11.2% of the international students and 10.1% of German students met the diagnostic criteria for MDD while the diagnostic criteria for other depressive disorder was met by 10.4% and 9.8% of the international and German students, respectively.

These prevalence rates are higher compared to the ones reported by other studies conducted in the general population. For example, in a recent review and reanalysis of data from several European countries, the 12-month prevalence of MDD was estimated to be 6.9% in the adult population (Wittchen, et al., 2011). Similarly, it has been found that the 12-month prevalence rate of MDD in the civilian adult population in the U.S. was 6.6% (Kessler, et al., 2003). However, there are some methodological differences between these two studies and the present one. First, in the study conducted by Kessler et al. (2003) the diagnosis of MDD was established based on face to face household surveys and not by self-reported instruments. Secondly, the review of Wittchen et al. (2011) and the study conducted by Kessler et al. (2003) assessed the 12-month prevalence rates for MDD, while the present study assessed only prevalence rates using a two-week time frame. Interestingly, because the time frame used in this study is significantly shorter, lower prevalence rates of MDD would have been expected.

For a better comparison, the prevalence rates among students should be examined. In general, the prevalence rates for both MDD and other depressive disorder were found to be higher in this study compared to other studies involving student populations. For example, the study conducted by Eisenberg et al. (2007) in a large random sample of university students in the U.S. established the prevalence rates for MDD (4.1% for undergraduates, 5.2% for graduates) and other depressive disorder (8.6% for undergraduates, 7.2% for graduates) by also using the PHQ as screening instrument. Compared to these results, the prevalence rates of MDD and other depressive disorder in the present study were higher for both international and German students. In Germany, Bailer et al. (2008) examined the prevalence rates of common mental disorders among university students. They found that 6.1% of the students screened positively for MDD and 8.1% for other depressive disorders.

The high rates of depressive disorders especially in the case of MDD reveals a serious situation that needs special attention considering that: 1) University students are at high risk for MDD considering that the median age of onset of this mental disorder is predominantly in the early to mid-twenties (Andrade, et al., 2003) that is, during the university years; and 2) results from several studies have shown that MDD can develop into a chronic disorder with a high risk of recurrence after onset (Andrade, et al., 2003; Solomon, et al., 2000). Therefore, the prevention, detection and adequate treatment among university students should be a central priority.

5.1.2 Somatoform disorder and somatic symptoms

The results of the study showed that the diagnosis of somatoform disorder was the most prevalent of the mental disorders assessed among both international and German students (13.5% in the total sample). According to the results, 13.9% of the international students and 13.4% of German students met diagnostic criteria for somatoform disorder at T1.

Again, comparisons of the prevalence rates of somatoform disorder are difficult mainly because studies differ in the sample populations as well as in the instrument used for the assessment of this diagnosis. The more important limitation of the screening instrument used in the present study (the PHQ) is that it cannot distinguish between medically explained and unexplained symptoms. This can result in an overestimation of the prevalence of this particular mental disorder. Furthermore, the diagnosis of somatoform disorder according to the PHQ is considered a subthreshold disorder because it is based on fewer symptoms than the ones established in the DSM-IV, which may also contribute to the higher prevalence rates.

Compared to the prevalence rates of somatoform disorder assessed by other studies in the general population, the prevalence rates in the present study were higher. For example, in the recent review of the prevalence of mental disorders in the EU conducted by Wittchen et al. (2011), the estimated 12-month prevalence rate of somatoform disorder was 6.3%. It is important to point out that in this review studies assessing mental disorders only by means of questionnaires or screening instruments were not included. Therefore, it is possible that more strict diagnostic criteria were applied resulting in lower prevalence rates.

However, the high prevalence rates in the current study (at least in the sample of German students) is congruent with the results of other studies conducted in Germany which have shown that somatoform symptoms are very frequent among the German population (Hessel, Beutel, Geyer, Schumacher, & Brahler, 2005; Rief, Hessel, & Braehler, 2001). A study in a large representative sample in Germany revealed that an undifferentiated somatization disorder was identified in 19.7% of the participants (Grabe, et al., 2003). Furthermore, high rates of somatoform symptoms and disorders have been described in samples of young people. A German study including a representative sample of adolescents and young adults (age range 14-25 years) showed that almost 40% of the participants reported that they have suffered from at least one somatic symptom without medical explanation, that had importantly affected their well-being (Hessel, Geyer, Schumacher, & Brahler, 2003). Similarly, an epidemiological study in a large representative sample of participants between 14 and 24

years of age in Germany revealed a 12-month prevalence rate of 7.2% for any somatoform syndrome (Lieb, Mastaler, & Wittchen, 1998).

Other studies have found similar or higher rates of somatic symptoms among university students. In a representative sample of the general population in Florence, Italy, a prevalence rate for undifferentiated somatoform disorder of 13.8% was found (Faravelli, et al., 1997) which is similar to that found in the present study. Among psychology students in Mexico, the prevalence of students who presented medium or severe somatic symptoms was 25.5% (González-Ramírez, Landero-Hernández, & Garcia-Campayo, 2009).

The study conducted by Bailer et al. (2008) once more provides a good opportunity for comparison as it used a sample of university students in Germany and the PHQ as a screening instrument for mental disorders. Similarly to the results of the present study, these authors found that somatoform disorder was the most prevalent mental disorder among university students and established a prevalence rate of this mental disorder of 9.1%. Again, this rate is lower than the one in the present study.

A factor that may contribute to the high prevalence rates of this mental disorder in the current study is the gender distribution. It has been consistently reported that somatoform disorders are more prevalent among females. As the recruited students in this study included 67% of females (which in turn showed significantly higher rates of somatic symptoms) this might explain, at least in part, the higher prevalence found in this study compared to others.

Even considering these potential limitations, the results of this study revealed that an important proportion of international and German students reported significant somatic symptoms.

5.1.3 Anxiety disorder and anxiety symptoms

The diagnosis of anxiety disorder according to the PHQ embraces the DSM diagnoses of generalized anxiety disorder and anxiety disorder not otherwise specified. The results indicated that 4.6% of the total sample met diagnostic criteria for this mental disorder (5.4% of international students and 4.4% of German students).

Compared to other studies, the prevalence rates of anxiety disorder were higher in the present study. For example, according to a recent review, the prevalence rate of generalized anxiety disorder for adults in the EU was estimated to be at 1.7% (Wittchen, et al., 2011). Similarly, in the German general population, the four-week prevalence of the same mental disorder was

1.2% (Jacobi, et al., 2004). Lower prevalence rates of generalized anxiety disorder have also been described in a community sample in the U.S (Grant, et al., 2005). Furthermore, lower prevalence rates of generalized anxiety disorder have been reported in non-Western samples (i.e., Asian, African or indigenous) (Lewis-Fernandez, et al., 2009).

Lower prevalence rates of generalized anxiety disorder have been found among university students. For example, a study conducted in the U.S. revealed that 2.9% of undergraduates and 3.1% of graduates met the diagnostic criteria for this mental disorder (Eisenberg, Gollust, et al., 2007). Similarly, 2.7% of Spanish female university students screened positive for generalized anxiety disorder and 0.7% for anxiety disorder not otherwise specified (Vazquez, et al., 2011).

The higher rates of anxiety disorder in the present study may be explained in part due to methodological differences. It is important to consider that the PHQ assesses two diagnoses under one category (and not separately), and most of the previous studies have only assessed the prevalence rates for generalized anxiety disorder.

Another explanation for the higher rates obtained in the present study may be related to the time-frame used. According to the DSM-IV, generalized anxiety disorder is diagnosed when symptoms are present for at least 6 months. On the contrary, the PHQ uses a time-frame of four weeks. It is possible then that other studies used more restrictive diagnostic criteria than the ones used in the present study.

As mentioned before, the study from Bailer et al. (2008) offers a good point of comparison because anxiety disorder was assessed with the same instrument in a sample of university students. Although in that study both diagnoses (generalized anxiety disorder and other anxiety disorder not otherwise specified) were included, the prevalence was still lower than in the present study (2.9% vs. 4.6%). Even though lower prevalence rates have been found in several of the reviewed studies, there are other studies that have called attention to the high prevalence of anxiety symptoms among university students. A study conducted in Turkey (*N* = 1617) revealed that 20.8% of all students had severe or extremely severe anxiety symptoms (Bayram & Bilgel, 2008). The study conducted by Zivin et al. (Zivin, Eisenberg, Gollust, & Golberstein, 2009) found that 4.7% of university students screened positive for the diagnosis of anxiety disorder. These results are concordant with other studies that have found high anxiety scores among university students (Pillay, Edwards, Sargent, & Dhlomo, 2001).

5.1.4 Differences between samples in prevalence rates and symptom severity

One main objective of the present study was to explore whether international and German students differ in the prevalence rates of mental disorders and the symptom severity. It was hypothesized that international students would have higher prevalence rates of MDD, other depressive disorder, somatoform disorder and anxiety disorder than German students.

The hypotheses included in the present study regarding the differences between international and German students were based on a) the scant body of research that have reported high rates of mental disorders and high levels of psychiatric symptoms among international students (Bhugra, 2004; Furukawa, et al., 1998) and b) on studies that have shown a strong relationship between migration and mental disorders (Bermejo, Mayninger, Kriston, & Harter, 2010; Conrad & Pacquiao, 2005; da Silva & Dawson, 2004).

In a first analysis, without considering the possible risk factors but rather only the prevalence rates, no significant differences between international and German students were found. Moreover, these two groups did not differ statistically in the severity of depressive, somatic and anxiety symptoms. Therefore, the hypotheses that international students would have higher prevalence rates of the assessed mental disorders as well as more severe symptoms were rejected.

The comparison of these results with other studies is almost impossible due to the fact that among the few studies that have investigated the mental health of international students, an even more limited number have assessed the full spectrum of mental disorders and none of them have included a control group of domestic students.

The fact that the groups did not differ in prevalence rates in the current study may partially be explained by particular characteristics of the sample. It is possible that students who have managed to study abroad represent a selective group characterized by, for example, more psychological resources. In fact, and as it will be discussed later, the sample of international students included in this study presented significant differences compared to the general population of German students, one of these differences being significantly lower neuroticism scores. In accordance with these results, there is evidence from several studies showing that voluntary migrants are relatively healthy, having healthy life styles and low rates of chronic illness (Lassetter & Callister, 2009), lower mortality rates and higher life expectancy (DesMeules, et al., 2004; Singh & Miller, 2004) as well as lower risk of illness (Muennig, Fahs, & Davis, 2002). The study of the “healthy immigrant effect” in relation to mental

disorders has been less studied. A study including a large community sample in Canada showed that immigrants had lower rates of depression and alcohol dependence than the Canadian born-population, especially among recent immigrants (Ali, 2002). There is also evidence that Mexican-born immigrants in the United States have better mental health than U.S.-born Mexican Americans (Escobar, Nervi, & Gara, 2000) including lifetime prevalence of MDD, dysthymia, alcohol abuse or dependence and drug abuse or dependence (Burnam, et al., 1987). Similarly to the results of the prevalence rates obtained in the present study, a recent study in Germany of a representative population sample (N = 2510) including a large variety of mostly well integrated immigrants and excluding asylum seekers and undocumented migrants (11.1%) did not find significant differences in the prevalence rates of depressive, somatoform and post traumatic stress disorder compared to native Germans (Glaesmer, et al., 2009).

However, although international students and German students did not differ in their prevalence rates for mental disorders, it is important to stress that the results of this study indeed reveal a high percentage of mental disorders among both samples, as has been previously explained.

5.1.5 Gender differences in the prevalence rates of mental disorders

No differences between female and male students were found for the prevalence of MDD and other depressive disorder, both in the total sample and for international and German students separately. In most previous epidemiological studies, it has been indicated that depressive disorders are more common among females than among males (Andrade, et al., 2003; Jacobi, et al., 2004; Rief, Nanke, Klaiberg, & Braehler, 2004). However, there are also studies in which gender differences have not been found among university students (Bailer, et al., 2008; Bayram & Bilgel, 2008). In the study conducted by Bailer et al. (2008) female and male university students did not differ neither in the prevalence rates of MDD nor other depressive disorder. In concordance with the explanations presented by these authors, the results in the present study reflect the fact that samples of university students may be more homogenous (e.g. educational level, age) rather than representative samples from the general population.

However, significant gender differences were found for the diagnosis of somatoform disorder. Female students in the total sample were around three times more likely to meet diagnostic criteria for this disorder. This significant gender difference was found in the sample of international students as well as among the German students. These findings are consistent

with a large body of research that has shown that somatoform disorders are significantly more prevalent among females (Bailer, et al., 2008; Jacobi, et al., 2004; Lieb, Pfister, Mastaler, & Wittchen, 2000). Wool and Barsky (1994) reviewed possible explanations for this phenomenon. Some of these explanations include: 1) gender differences in admitting discomfort; 2) readiness to seek medical attention; 3) higher prevalence rates of psychiatric disorders which frequently include somatic symptoms (e.g. depression) among women; 4) innate gender differences in threshold, tolerance as well as sensitivity to minor bodily sensations and 5) differences in relational patterns (Wool & Barsky, 1994). Other psychosocial factors that have been mentioned are the history of sexual or physical abuse, lower threshold for seeking assistance and gender differences in social roles (Kroenke & Spitzer, 1998).

Gender differences were also found in the total sample for the diagnosis of anxiety disorder. Results revealed that significantly more females met diagnostic criteria for this mental disorder. In fact, they were two times more likely than men to have this diagnosis. These results are concordant with other studies that have indicated that anxiety disorders are more common among females (Bayram & Bilgel, 2008; Eaton, et al., 2012; Eisenberg, Gollust, et al., 2007). However, when comparing the gender differences in the sample of international and German students separately, the results revealed that this difference was found only among German students. An explanation could be that the sample of international students is a particular selective population of students with specific characteristics. It is possible that although international students have different cultural backgrounds, they may present certain homogeneity due to the selective process of studying abroad, which may have ruled out potential differences due to gender.

5.1.6 Comorbidity

From the group of students with a current mental disorder, more than a quarter presented a comorbid diagnosis. Although this rate is lower than that found among the general population (Jacobi, et al., 2004) and in young adults in other studies (Aalto-Setala, Marttunen, Tuulio-Henriksson, Poikolainen, & Lonnqvist, 2001), this can be explained because these previous studies assessed a greater number of mental disorders also including alcohol and substance abuse (which is a highly comorbid condition).

In fact, the current results show a relatively high comorbidity for both international and German students, even taking into account that the present study assessed only a limited

number of mental disorders and that two of them were mutually exclusive (MDD and other depressive disorder).

A high co-occurrence between MDD and anxiety disorders was found. This is congruent with other studies in the general population (Andrade, et al., 2003; Kessler, et al., 2003) and in university students (Eisenberg, Gollust, et al., 2007). Comorbidity between the diagnosis of other depressive disorder and anxiety was lower than for MDD. This is concordant with the results from a study conducted by Eisenberg et al. (2007), and probably relates to the fact that MDD is a more severe disorder, and is therefore more prone to be accompanied by other psychiatric disorders.

According to the current results, there was also a high co-occurrence of somatoform disorder and both MDD and other depressive disorder. These results are also congruent with other studies (Garyfallos, et al., 1999; Haug, Mykletun, & Dahl, 2004). It has been suggested that the high prevalence of somatic symptoms among people with depressive or anxiety disorders may be because some somatic symptoms can arise from anxiety or depressive symptoms [e.g, the presence of anxiety and anhedonia might lead to the perception and reporting of chest pain or fatigue (Haug, et al., 2004)]. Other explanations may be that people with depressive and anxiety disorders could have a lower threshold for the experience of somatic symptoms (Haug, et al., 2004), that psychiatric symptoms are a result of chronic unexplained somatic symptoms, or that these disorders might share common underlying processes (Garyfallos, et al., 1999).

The high comorbidity among mental disorders is an important finding considering that this factor per se is an indicator of severity of mental disorders. As the lack of detection of comorbid diagnoses can worsen the course and prognosis of mental disorders, this finding has to be carefully taken into account when evaluating the mental health of a student population.

5.2 Psychological and psychiatric treatment, medication intake and perceived need of assistance

One of the research questions included in the study referred to the treatment that students with mental disorders were (or were not) receiving. For this purpose, students were asked about medication intake, whether they were in psychological or psychiatric treatment, and whether they thought they needed any psychological or psychiatric assistance due to their current condition.

The results showed that both international and German students who met criteria for at least one mental disorder had a low perceived need for assistance. According to the results, only 30% of international students and 21.4% of German students who screened positively for at least one mental disorder reported the need of psychiatric or psychological assistance.

Furthermore, among all of the international and German students that met the criteria for at least one disorder, an even smaller percentage were actually undergoing treatment for mental health problems (6.6% and 11.6% respectively) or were taking psychiatric medication (3.8% and 5.3% respectively). These markedly low rates of "being in treatment" can be partially explained by the lack of perceived need of assistance. However, there is still a high percentage of students who perceived a need for help, but were not in treatment.

The lack of a perceived need for help, as well as low rates of treatment among students with mental disorders is consistent with previous research. Although there are few previous studies that examined the treatments received by students suffering from mental disorders, and most of the available information refers only to students seeking assistance or attending counseling services, some reports have shown that mental disorders are commonly under-treated among the student population. For example, a recent study that investigated the adequacy of depression treatment in a large sample of college students found that adequate treatment was received only by 22% of depressed students (Eisenberg & Chung, 2012). A longitudinal study involving a sample of university students showed that most of the students who screened positively for a probable mental disorder did not receive treatment, had a low perceived need for help, and also showed a lack of use of mental health services (Zivin, et al., 2009).

Further analyses of the current data indicated that the situation of international students is even more serious. With international students having similar prevalence rates of mental disorders compared to German students, significantly more international students diagnosed with a mental disorder were without any treatment. Additionally, significantly more

international students reported the need for mental health assistance compared to German students. These results are congruent with the results of other studies that have shown an underutilization of mental health and counseling services by this population (Bradley, et al., 1995; Hyun, et al., 2007; Yakushko, et al., 2008).

There are several reasons that may explain that significantly fewer international students were in actual psychological or psychiatric treatment. It has been reported that among migrant populations language barriers, lack of familiarity with the health care system and different perceptions of illness and treatment (Priebe, et al., 2011) might lead to an underutilization of health care systems. The results from a previous study addressing the use of counseling services among international graduate students revealed that this group exhibited lower knowledge of counseling services at the university campus compared to domestic graduate students (Hyun, et al., 2007). Furthermore, Mori (2000) suggested that this underutilization of mental health services may also be explained due to differences in basic beliefs of mental health problems, the unfamiliarity with the concept of counseling, the fear of stigmatization, or the presence of negative expectations regarding the treatment.

5.3 Measurement invariance of latent constructs

Configural, metric and scalar invariance of the scales for the assessment of neuroticism, extraversion, social support and resilience were examined across samples. The results indicated that the requirements for full scalar invariance were met for extraversion, social support and resilience. The requirements for partial scalar invariance were met for neuroticism.

Testing for measurement invariance is an important issue when groups of individuals are compared. Too often, psychological studies are conducted assuming that instruments measure the same construct in the same way in all samples, ignoring the necessity of testing measurement invariance. In fact, it has been suggested that in studies in which different groups (e.g. female vs. male) or cultures (e.g. Germans vs. non Germans) are compared, it is important to established measurement invariance before accurate inferences and interpretations can be made (Horn & McArdle, 1992; Milfont & Fischer, 2010).

So far, no studies examining the mental health of international students and its predictors have conducted invariance analyses, mostly due to the lack of research including a reference group. The present study goes a step further than other studies by testing measurement invariance

across samples of international and German students. In the process of testing the factorial validity of the instruments in order to examine how well they measured latent constructs (given the data collected for the present study), and in order to establish a baseline model for the invariance tests, some modifications were made to improve the fit of the model. Most of the misspecifications of the modesl were explained by the fact that for the present study, short versions of the instruments assessing only a single dimension for each construct (e.g. social support) were used. However, in the full version of these instruments, several factors are assessed (e.g. emotional, instrumental and informational social support) and therefore the models were respecified based on this information.

Because in the current study partial or full scalar invariance was reached, meaningful comparisons could be made. That means, for example, that differences in social support were due to "true" differences between international and German students in social support, and not because the scale was actually measuring different concepts in each sample or due to systematic biases in the way these two groups responded to the scale. In summary, the detailed examination of the factorial validity and invariance across samples of measurement instruments (assessing the latent constructs of neuroticism, extraversion, social support and resilience) strongly point to the fact that the conclusions drawn from the results of the present study are reliable.

5.4 Differences between international and German students in the scores of predictors

A further aim of the present study was to examine whether international and German students differed in the scores of potential predictors associated with mental disorders and severity of symptoms. The purpose at this point was to explore if international students are different compared to domestic students based on relevant psychological variables such as personality traits, social support, resilience, stress levels, traumatic life events as well as positive and negative life experiences. Such comparisons are crucial due to the lack of research on this topic and the absence of studies including a control group of domestic students. Despite the lack of previous research on the topic, it was possible to hypothesize that these two samples present different characteristics. First, international students represent a selected group of university students in their own country, mostly above average in terms of academic performance, who decide to study abroad and pursue this difficult goal. Secondly, most of these students come from countries with significant cultural differences compared to the host

country (Germany). Thirdly, the experiences and problems that international students face in the host country may be very different from the experiences of domestic students.

In fact, the results of the current study revealed significant differences between international and German students in most of the psychological variables included as potential predictors of mental health.

Neuroticism

International students showed significantly lower neuroticism scores compared to German students, with the mean score of German students being nearly twice as high as the mean score obtained by international students. Cohen's *d* revealed a large effect for the observed means (d = -1.05) as well as for latent means (d = -1.68). This is the first study in which comparisons between international and domestic students involving this personality trait were made and therefore, it is not possible to compare these results with those of other studies. Nevertheless, some important observations and hypotheses can be made based on these results. In the first place, the current results show for the first time (to our knowledge) that international and domestic students might have different personality characteristics. As mentioned before, an explanation for the lower neuroticism scores among international students may be because this sample might constitute a highly-selective group of students from their own country with certain personality characteristics that enable them to achieve the goal of studying in a different country, e.g., emotional stability. In order to complete the process of going abroad and be enrolled at a foreign university, many difficult steps have to be completed, such as searching for financial sources (e.g. scholarships), success with the completion of the application and in selection processes, learning a new language and organizing a new life in the host country. Students who are predisposed to experience negative affects like anxiety, anger, depression or who are emotionally unstable (high neuroticism) may not feel prone to plan and decide to study abroad, or simply do not succeed in achieving this goal. As discussed before, several studies have suggested that migrants may have better health outcomes than the original population in the immigration country (the so-called "healthy migrant effect" (DesMeules, et al., 2004; Lassetter & Callister, 2009; Singh & Miller, 2004) because, among other reasons, only healthier individuals would be able to emigrate in the first place (Kolcic & Polasek, 2009). Although the "healthy migrant effect" has been mostly studied in relation to physical morbidity and mortality rates, it could be hypothesized that not only physically, but also psychologically healthier migrants are able to

move to a new country. This phenomenon may be especially present in voluntary migrants like international students rather than in forced migrants like refugees or asylum seekers.

Extraversion

Significant differences between international and German students were also found in extraversion scores. International students had a significantly lower mean score of this personality trait compared to German students. Effect size statistics showed a large difference in extraversion scores between these two samples for the observed means (d = -1.38) as well as for the latent means (d = -1.24). Similar to neuroticism, to date, there are no studies that have assessed the personality trait of extraversion among international students, especially not compared to a control group of domestic students. It could have been expected that international students would obtain higher extraversion scores when considering that individuals that score high on extraversion have been described as energetic, confident, assertive, prone to feel comfortable in social situations, who like excitement and have a cheerful temper (Borkenau & Ostendorf, 1993; Watson & Clark, 1997). All of these personality characteristics could be associated with the will to move to a new country and the achievement of the necessary goals involved in this process. However, the results obtained here can be interpreted in a different way. Individuals who are introverted have been described as reserved, independent and prone to feel comfortable being alone (Borkenau & Ostendorf, 1993). Therefore, it can be suggested that these characteristics can facilitate the decision and process of leaving the home country and being separated from relatives and a social network. Lower extraversion scores among international students may contribute to helping them to better tolerate being alone, without close contact with family members and friends from their home country.

In summary, the results of this study suggest that international students have different personality characteristics than German students, at least concerning the personality traits that were assessed.

Social support

International and German students also differed in scores of social support. The results showed that international students had significantly lower social support than German students. The effect sizes show a medium difference between these two samples for observed means (d = - 0.59), as well as for latent means (d = - 0.67). Based on the few studies that have

assessed this construct among international students (Furukawa, et al., 1998; Hefner & Eisenberg, 2009; Misra, et al., 2003), it was hypothesized in the present study that lower social support would be found among international students. Therefore, this specific hypothesis was supported by the data.

Comparisons between these results and the results from other studies are difficult due to the scarcity of studies in this field. Even more so, the few studies that have assessed social support among international students (Furukawa, et al., 1998; Misra, et al., 2003; Sumer, et al., 2008) did not include a control group of domestic students. Only the study conducted by Hefner and Eisenberg (2009) which examined social support and mental health among college students in the U.S. included domestic and international students in its sample. Even though the work of these authors did not focus on international students but on the general population of university students, in concordance with the results of the present study, they found that international students reported a lower quality of social support than other students enrolled at the same university (Hefner & Eisenberg, 2009).

The fact that international students had lower social support compared to German students in the present study was not surprising for several reasons. First, some studies which have investigated the relation between social support and migration found lower social support among migrants (Aksel, Gun, Irmak, & Cengelci, 2007; de Almeida Vieira Monteiro & Serra, 2011). Secondly, international students usually leave their source of social support, which includes family and friends, in their home country. Furthermore, they often know few people - if any- in the country of destination. Thirdly, language barriers and cultural differences may complicate the process of building a new social network in the host country.

In the present study and according to the measurement instrument used, social support was assessed as one dimension. For future research, it could be of interest to assess different subtypes of social support (i.e. instrumental, informational and emotional) and to examine possible differences between international and domestic students on each subtype of social support.

Stress, positive and negative life experiences

Another significant difference between international and German students was found in relation to stress levels. As was hypothesized, international students reported significantly higher stress levels at T1 (d = 0.29) and at T2 (d = 0.44). However, the effect size showed a small difference in the mean stress scores between these two samples.

As has been explained before (see 1.3.3.1.2), one of the forms in which stress can be measured is through the assessment of life events and by the subjective severity rating associated to each event (Sarason, et al., 1978; Schwarzer & Schulz, 2002). Therefore, the results regarding differences between international and German students in the scores of negative and positive life experiences between T1 and T2 will be discussed together with the stress results.

The results indicated that international students reported significantly higher scores of negative life experiences between T1 and T2 compared to German students. However, a statistical significance in the effect size indicated a small difference between these two samples in the mean scores of this variable ($d = 0.33$).

The results showed that international and German students did not differ significantly in scores of positive life experiences between T1 and T2.

Again, comparisons between these results and similar studies are not possible due to the lack of research on international students in which stress levels are compared between this population and a reference group of domestic students. However, the hypotheses that stress levels and negative life experiences scores may be higher among international students were based on previous research. Studies have suggested that international students may face more problems than domestic students because they have to deal not only with challenges derived from the normal development and academic life (Toyokawa & Toyokawa, 2002), but also from the adaptation to a new culture and to a new social and educational environment (Poyrazli, et al., 2010), while having less access to social support systems (Pedersen, 1991). Additionally, it has been described that international students are often forced to deal with problems in relation to their new general living conditions, in relation to adjustments to a new academic system, and to a new society with new norms and customs, and also facing personal psychological adjustments (Tseng & Newton, 2002). Therefore, the fact that international students reported higher stress levels and negative life experiences scores than domestic university students was not unexpected. The importance of these results lies in the confirmation of a hypothesis that had not been previously explored. Nevertheless, the effect sizes of these differences were not as large as could have been expected. A possible explanation could be that other factors may influence the perception of stress. According to the literature, some of these factors are the interpretation of the significance of stressful events as well as the evaluation of own coping resources and abilities (Cohen, et al., 1997; Kopp, et al., 2011; Lazarus, 1990). Personality traits and especially neuroticism may play an important

role in the perception of stress. For example, individuals with high neuroticism are likely to worry despite the presence or absence of threats (McCrae, 1990). McCrae suggested that differences among individuals in the perception of stress may not necessarily mean that the one who described higher distress is the one who is actually under more stress, but it could mean that one person may be simply more prone to distress (McCrae, 1990). As it has been discussed above, the results of the present study indicate that international students have significantly lower neuroticism scores compared to German students. This personality trait may influence the perception of stress among this group. Although international students reported significantly higher stress, the small size effect of this difference could be explained because international students - based on their lower neuroticism scores - may not be as prone to experience distress as German students.

Resilience

According to the results, international and German students did not differ significantly in the observed and latent means of resilience, which can be considered a positive personality characteristic that enhances individual adaptation. Because this is the first study that has compared this psychological construct between international and domestic students, it is not possible to compare these results to those of other studies. Although no concrete hypothesis was made regarding differences in resilience means between samples, based on the current literature describing the "healthy migrant effect", which was previously explained in relation to the differences in neuroticism scores, it could have been expected that the resilience scores in the group of international students would have been higher. However, it can also be considered that university students represent a more homogeneous group of individuals with certain characteristics in which differences are not as marked as they could be for example, in a community sample. Other factors that may have influenced the resilience scores in the present study could be the content and formulation of the items included that evaluated resilience, which included statements about positive personality characteristics, reinforcing the presence of social desirability bias, which is not uncommon in self-report questionnaires.

Traumatic life events

The results showed that international students experienced significantly more traumatic life events compared to German students. While the mean of traumatic life events in the sample of German students was 2.31 (SD = 2.09), international students had a mean of 3.17 (SD = 2.75). However, the effect size statistic showed that this was a small difference (d = 0.35).

Due to the lack of literature on this topic, differences in the means of traumatic life events were analyzed from an explorative point of view and no specific hypothesis was formulated.

These findings are not necessarily surprising. With Germany being a developed country it would be expected that the occurrence of certain traumatic life events would be lower than in other countries. For example, individuals from low-income countries may have been exposed more frequently to war-related violence (Benjet, 2010). The experience of the sudden death of a relative or loved one may be higher in countries with lower life expectancy and higher mortality rates. For example, and according to the last WHO's annual World Health Statistics report (World Health Organization, 2012), the life expectancy at birth in Europe and in high-income countries are the highest compared to other regions like Africa and low income countries. Similarly, Europe and high income countries have the lowest infant and adult mortality rates. Risk factors for higher mortality included in the WHO report like the lack of sanitization, unsafe water, lack of appropriate health care or childhood under-nutrition may be present more often in other countries but not in Germany. Furthermore, it would be expected that the experience of traumatic life events including natural disasters like hurricanes and earthquakes, which would be more common in countries where such phenomena are more frequent.

Similar to other predictors of mental disorders included in the present study, hitherto the experience of traumatic events has not been studied in samples of international students or compared to domestic students. Therefore, these results offer a starting point for further research. For example, in the present study according to traumatic life events it was only assessed whether or not certain events were experienced, leaving other questions open such as the emotional response these events may have caused. Furthermore, it would be of interest to assess a more detailed description of the experience of these traumatic life events (e.g. age of occurrence or number of times these events have occurred).

5.5 Analysis of predictors of mental disorders and symptom severity at T1

This section will examine the role of potential predictors in the development of mental disorders and symptom severity among international and German students. Furthermore, the results concerning the differences in the effect of these predictors between these two samples will be discussed. The results of logistic regressions conducted on the diagnoses of mental disorders as well as the results of multiple linear regressions on the severity of symptoms at T1 will be discussed based on the existing literature.

Four models were tested for each outcome variable based on the recommendations of Aiken and West (1991). While logistic regressions were computed including the observed variables, multiple regression analyses were conducted also including the latent variables (i.e. neuroticism, extraversion, social support and resilience). The results regarding the main effects of the predictors will be mainly discussed in light of the first model which did not include interactions. This decision was made because when interaction terms are included in the model, the meaning of the main effects of the corresponding variables differs from the meaning without the interaction term (Aiken & West, 1991). The results of interaction terms will be mainly discussed based on the final model including only main effects, significant interactions and the theory-based interaction between social support and stress. When necessary, results from other models will be discussed.

5.5.1 Major depression disorder, other depressive disorder and depressive symptoms

The results of logistic regression analyses on MDD revealed that when other covariates were held constant, male gender, lower age, higher neuroticism, lower extraversion and lower social support were significant predictors of this diagnosis. Additionally, the status of international student was also a significant predictor of this diagnosis.

For the diagnosis of other depressive disorder, higher neuroticism and lower extraversion were found to be significant predictors. Unlike for MDD, the interaction between social support and stress was a significant predictor of other depressive disorder, supporting the hypothesis that social support buffers the negative effects of stress.

Regarding the severity of depressive symptoms, significant main effects of predictors were male gender, lower age, higher neuroticism, lower extraversion, higher stress levels and having experienced more traumatic life events. The results also indicated that the status of international student significantly predicted the depressive symptoms at T1. Moreover, the interaction term between social support and stress was significant and its effect differed between international and German students.

Therefore, although the results showed some similarities in the significant predictors of these three outcomes (MDD, other depressive disorder and depressive symptoms), some differences were found. A possible explanation for this phenomenon may be that despite the fact that these outcomes involve the assessment of depressive symptoms, they actually describe different entities. For example, MDD represents a specific combination of symptoms with a

certain severity that causes significant distress and interferes with important areas of functioning (e.g. work, social activities). On the other hand, fewer symptoms are needed to establish the diagnosis of other depressive disorder according to the PHQ. Moreover, in the case of depressive disorder not otherwise specified, it can be expected that the impairment caused by these symptoms is not as severe as the one caused by MDD. This can also explain the differences in the explained variances of each model. While the final models explained a significant portion of the variance for MDD (between 23.9% and 49.1%) and for the severity of depressive disorders (57.8% for international students and 64.8% for German students), the explained variance in the final model for other depressive disorder was much lower (between 4.6% and 9.6%), indicating that other variables not assessed in the present study may play an important role in the development of this latter diagnosis.

Importantly, when examining only the differences in the prevalence rates of mental disorders or the severity of symptoms between samples, it could be thought that there are no differences between international and German students, and that the first group is not at higher risk for the development of mental disorders. However, regression analyses indicated that when other variables were held constant, this apparent lack of differences disappeared. The results showed that being an international student was, in fact, a significant risk factor, not for the development of the less intense depressive disorders (i.e. other depressive disorder), but for the diagnosis of MDD, as well as for more severe depressive symptoms. Therefore, the results supported the hypothesis that the status of international students is a significant predictor of MDD and of the severity of depressive symptoms.

Another important finding was that neuroticism stood out as a core predictor of the development of MDD, other depressive disorder, as well as of the severity of depressive symptoms, and that its effect did not differ between international and German students. These results supported the hypothesis that a higher neuroticism score is a significant predictor of MDD, other depressive disorder and of the severity of depressive symptoms. These findings are consistent with a large body of research that has indicated there is strong positive association between neuroticism and depressive disorders and depressive symptoms (Rosellini & Brown, 2011; Watson, Gamez, & Simms, 2005). Furthermore, several studies have described a significant relationship between this personality trait and the onset of depressive episodes (De Graaf, et al., 2002; Fanous, et al., 2007; Kendler, et al., 2006). The present study also extended these results for both the general population of university students, and the population of international students.

The importance of personality traits as predictors of depressive disorders or symptoms was not limited to neuroticism. Extraversion was also associated with MDD, other depressive disorder and severity of depressive symptoms. For these three outcome variables, lower extraversion was a significant predictor, even after controlling for other psychological and demographic variables. These results are consistent with previous literature which have found the same negative association between extraversion and depressive disorders or depressive symptoms (Kotov, et al., 2010; Watson, et al., 2005). For example, the meta-analysis conducted by Malouff et al. (2005) suggested that there is a typical pattern of high neuroticism and low extraversion across all types of clinical symptoms including mood disorders. In the same way as in other previous studies (Watson, et al., 2005), in the present study the association between neuroticism and depressive disorders or depressive symptoms was much stronger than for extraversion. It is possible then to hypothesize that the strong effect of neuroticism as a predictor of MDD and the significantly lower scores of this personality trait among international students, may have contributed to the lack of differences between samples in the prevalence rates of this mental disorder. This hypothesis is supported by the fact that when the effect of neuroticism (and other variables) is held constant, differences between samples become more evident, with international students being at higher risk for mental disorders.

The main effect of stress was also found to be a significant and important predictor of MDD and of the severity of depressive symptoms, an effect that did not differ between international and German students. These results support the hypothesis that higher stress levels are a significant predictor of both the diagnosis of MDD and of the severity of symptoms, in concordance with other studies which have shown that high levels of stress are associated with the onset of major depressive episodes (Hammen, 2005; Kendler, et al., 1999; Mazure, 1998; Slopen, et al., 2011) as well as with an exacerbation of depressive symptoms (Spinhoven, Elzinga, Roelofs, et al., 2011). Although the main effect of stress was not associated with the diagnosis of other depressive disorder, it was contained in the significant interaction between social support and stress in the sample of German students (please see further text).

As expected, lower social support was a significant predictor of MDD. This finding is consistent with several studies that have described that lower social support is related to higher depressive symptomatology and to an increased risk for MDD in different populations (Romanov, et al., 2003; Strine, et al., 2008; Wade & Kendler, 2000), including university students (Clara, et al., 2003; Hefner & Eisenberg, 2009). The effect of social support on MDD

did not differ between international and German students. Contrary to expectations, the main effect of social support was neither a significant predictor of the diagnosis of other depressive disorder, nor of the severity of depressive symptoms. However, support for the theory-based hypothesis that social support buffers the negative effects of stress was indeed found for the less severe diagnosis of other depressive disorder and for the severity of symptoms, but only in the sample of German students. Interestingly, in this sample, this buffering effect can be found only when stress levels are low. In fact, as stress increases, social support loses its role as a buffer. In the case of international students, social support did not play a significant role in protecting against the negative effects of stress. Several of the few studies addressing the situation and mental health of international students have emphasized the importance of social support in relation to depression or psychiatric symptoms (Furukawa, 1997a; Sumer, et al., 2008). In the present study however, other variables were outlined as more relevant predictors among this population. Although the main effect of social support was found to be significantly associated with MDD, other predictors showed higher significance levels.

The hypothesis that students who have experienced more traumatic life events would be at higher risk for depressive disorders and symptoms, received support only regarding the severity of depressive symptoms. Although many studies have indicated a significant relationship between several traumatic life events and depressive disorders (Galea, et al., 2002; Maes, et al., 2000; Neria, et al., 2010), this significant relationship was not found for the assessed depressive disorders but only for the severity of these symptoms. A reason for these results could be that in the present study only the objective experience of potential traumatic life events was examined and not the emotional response or the actual impact of those events, potentially leaving behind relevant information which may have contributed to significant associations which other studies have reported.

Additionally, gender was found to be a significant predictor of MDD and of the severity of depressive symptoms. Contrary to a large and robust body of research in psychopathology that has indicated that females are at higher risk for depressive disorders compared to males (Lucht, et al., 2003; Piccinelli & Wilkinson, 2000; Vazquez & Blanco, 2008; Wittchen, et al., 2011), in the present study regression analyses showed that when other variables were held constant, male students had a significantly higher risk for MDD and for the severity of depressive symptoms. No gender effect was found for the diagnosis of other depressive disorder, and the effect of gender did not differ between international and German students for any of the studies variables. A reason for these apparent discrepant results with previous literature could be that students who participated in the present study might constitute a

selective sample with specific characteristics. As suggested by other authors in regard to gender differences in the prevalence rates (Bailer, et al., 2008), these results could have been influenced by a selection bias in which more male students with depressive symptoms participated in the study. On the other hand, this result may be due to the covariates included in the model. In fact, the higher risk for depression among women has been attributed to a wide variety of factors also including a greater exposure to negative and traumatic life events (Hyde, Mezulis, & Abramson, 2008) and experience of more severe stressful life events (Stroud, Davila, & Moyer, 2008). Several studies have indicated that compared to depressed men, depressed women experienced significantly more severe life events and a greater frequency of negative interpersonal events before the onset of a depressive episode, with women being more likely to experience a major depression in response to stressful life events (Maciejewski, Prigerson, & Mazure, 2001; Spangler, Simons, Monroe, & Thase, 1996). Furthermore, the results from several studies indicated that neuroticism means among females were higher than among males (Costa, et al., 2001; Goodwin & Gotlib, 2004; Lynn & Martin, 1997; Weisberg, Deyoung, & Hirsh, 2011). Therefore, the effect of these variables may put females at higher risk for depression and when their effect was held constant, the risk for male participants increased. Replication studies are warranted to confirm or reject these hypotheses.

Lower age was also found to be a significant predictor of MDD and of the severity of depressive symptoms. These findings are not surprising considering that university students are experiencing an important transition and adaptation process at the beginning of their studies. University students are exposed to circumstances and expectations which can constitute risk factors for mental disorders or can exacerbate pre-existing conditions (Cleary, Walter, & Jackson, 2011). According to Cleary et al. (2011), potential stressors during this period are losing friends from school and searching for a new social network, moving away from home, having more self-management responsibilities, increased autonomy, dealing with new learning methods and academic demand.

Contrary to the expectations, resilience was not found to be a significant predictor of MDD, other depressive disorder or for the severity of depressive symptoms. Besides the possibility that in fact resilience was not associated with depressive disorders or depressive symptoms, the inclusion of other strong predictors (e.g. neuroticism) in the regression models might have contributed to an important reduction in the effect of resilience on the outcome variables. As has been previously discussed regarding the differences in the resilience scores between samples, the presence of social desirability bias may have also influenced the way individuals answered the questionnaire, making the interpretation of individual differences more difficult.

5.5.2 Somatoform disorder and severity of somatic symptoms

The results indicate that when other covariates were held constant, significant predictors of the diagnosis of somatoform disorder were female gender, higher neuroticism, higher stress levels and the experience of more traumatic life events. The results also indicate that the effect of neuroticism differed between international and German students.

The effects of significant predictors of the diagnosis of somatoform disorder were also found to be significant for the severity of somatic symptoms. Additionally, lower age, higher social support and the status of international student significantly predicted the severity of somatic symptoms. For this outcome variable, the effect of neuroticism also differed between international and German students.

The results showing a higher risk of female students for meeting diagnostic criteria of somatoform disorder as well as for more severe somatic symptoms are consistent with a large previous body of research. Epidemiological studies have shown a significantly higher prevalence of somatoform disorders among women in the general population (Jacobi, et al., 2004; Wittchen, et al., 2011), as well as among university students (Bailer, et al., 2008). Kroenke and Spitzer (1998) also described that medically unexplained symptoms were more often reported by females and that symptom reporting was independent of psychiatric comorbidity. As previously described, several explanations have been proposed to this gender difference including cultural factors, higher prevalence of comorbid disorders among women which convey somatic symptoms, or gender differences in perceptions and tolerance of body sensations (for more details, please see 5.1.5).

Again, neuroticism stood out as an important risk factor, this time for somatoform disorder as well as for the severity of somatic symptoms. As hypothesized, students with higher neuroticism (international and German) were at higher risk for both outcome variables. Among personality traits, neuroticism has been found to be the strongest and broadest predictor of psychopathology (Watson, et al., 2006). Although associations between neuroticism, somatoform disorder and psychosomatic symptoms have not been studied as widely as for other mental disorders, previous studies conducted on this topic have shown that there is a significant relationship. For example, neuroticism has been positively associated with psychosomatic symptoms in the general population (Rosmalen, et al., 2007). It has also been found that individuals with higher neuroticism or negative affectivity report more somatic symptoms and medically unexplained physical symptoms (Kolk, Hanewald, Schagen,

& van Wijk, 2002; Neeleman, Ormel, & Bijl, 2001). Several mechanisms have been suggested to explain this relationship. Individuals with high neuroticism may pay more attention to physical sensations and symptoms (especially in the presence of psychiatric disorders). Also, neuroticism may produce its negative effects through physiological mechanisms or lifestyle. Finally, it has been suggested that somatic and psychiatric illness can lead to increased neuroticism (Vassend, et al., 2011).

In the current study, significant differences were found between international and German students in the effect of neuroticism on the diagnosis of somatoform disorder and on the severity of somatic symptoms. These findings revealed that with high neuroticism, the probabilities of meeting diagnostic criteria for somatoform disorder increased for both samples. However, this increase was significantly higher for international students. Similarly, the severity of somatic symptoms increased in both samples as neuroticism increased, but with high neuroticism international students had higher levels of somatic symptoms than Germans. With this study being the first that explored such differences, comparisons with other studies are not possible. Therefore, an important contribution of the present study to the previous research is that a positive association between neuroticism and the diagnosis of somatoform disorder and the severity of somatic symptoms was examined (and confirmed) in a sample of international students as well as in a large sample of German students.

Another central predictor of both the diagnosis of somatoform disorder and the severity of somatic symptoms was stress levels. As hypothesized, students with higher stress were more likely to meet diagnostic criteria for this disorder and were at higher risk for more severe somatic symptoms. This effect did not differ between international and German students.

This finding is compatible with previous research that has described a positive association between stress and physical and mental health (Cohen, et al., 2007). Stress has been linked to medically unexplained somatic symptoms (Steinbrecher & Hiller, 2011) and functional abdominal pain (Boey & Goh, 2001; Schulte, et al., 2010). The current results are important because they emphasize the importance of paying attention to somatic symptoms in the university population, considering a) the high prevalence rates found in the present study and b) the high stress levels among university students (Al-Dubai, Al-Naggar, Alshagga, & Rampal, 2011; Hamaideh, 2011; Tesfaye, 2009) and international students (Pedersen, 1991; Tseng & Newton, 2002) that have been consistently reported in previous studies.

Another significant predictor of the diagnosis of somatoform disorders and for the severity of somatic symptoms was the number of traumatic life events, supporting the hypothesis that

students who have experienced more traumatic life events are at higher risk of both outcome variables. Additionally, the effect of this predictor did not differ between international and German students. The experience of traumatic life events has been previously studied mostly in relation to post-traumatic stress disorder or anxiety symptoms. In some of the studies that have examined the association between these events and somatoform disorders or somatic symptoms this positive association was also found (Escobar, et al., 1992; Labbate, et al., 1998). For example, adverse childhood experiences such as sexual abuse or neglect were associated with a greater number of somatized and physical symptoms (Dickinson, deGruy, Dickinson, & Candib, 1999; Walker, et al., 1999).

Most of the studies that have assessed the negative outcomes associated with the experience of traumatic life events have focused on populations at high risk for such events (e.g. refugees, populations living in war zones) or on individuals who in fact have faced traumatic experiences. However, it has been described that traumatic life events are quite common among the general population (Galea, et al., 2005; Norris, 1992). The contribution of the present study expands the knowledge on this topic revealing that the experience of traumatic life events was also very prevalent among international and German students. This is relevant considering that these populations might not be readily considered to be at high risk for these events, and that these events can put a young population at higher risk for more severe somatic symptoms.

Age was also found to be a significant predictor of the severity of somatic symptoms but not of the diagnosis of somatoform disorder. Although the literature has shown an association between older age and more somatic symptoms (Neeleman, et al., 2004), it is important to consider that compared to other studies, the participants in the present study were relatively younger (mean age was 25.92 and 23.87 for international and German students respectively) and homogenous in terms of age. Therefore, the somatic symptoms associated with the process of aging may not have been as present as in other studies. As explained before for MDD and depressive symptoms, the beginning of the university years are part of an important transition and adaptation process in which students are exposed to potential stressors that can put them at higher risk for mental health disorders (Cleary, et al., 2011).

The finding that high social support was a significant predictor of more severe somatic symptoms was contrary to the expectations and should be examined in future studies. However, some tentative explanations can be formulated. Because both variables were assessed at the same time, causality cannot be established. It is therefore possible that students

who had more severe somatic symptoms needed the active support of their social networks and they therefore also perceived having a higher level of social support as a result. Another aspects that could be further studied to explore this result refers to the potential "secondary gains" of disease or interpersonal advantages of having symptoms of physical disease (Fishbain, 1998), and the potential negative effects of social support (Taylor, et al., 2004).

The interaction between social support and stress on somatoform disorder and on the severity of somatic symptoms was not found to be significant. Therefore, like in previous studies the buffering hypothesis of social support was not supported for this outcome (Burton, et al., 2004; Maulik, et al., 2010).

The results showed that contrary to the expectations, the main effect of the status of international student was not a significant predictor of the diagnosis of somatoform disorder. However, when neuroticism was included in the interaction, it is evident that at high neuroticism, international students were at higher risk for somatoform disorder than German students. Additionally, when the severity of somatic symptoms was examined, the results supported the hypothesis that international students were at higher risk for more severe somatic symptoms compared to German students. Interestingly, a first descriptive examination of the data showed that there was no significant difference in the mean scores of somatic symptoms between German and international students. Therefore, it could be erroneously inferred that international students do not have a higher risk of somatic symptoms. However, as described, the results of regression analyses revealed that when the effect of other variables were held constant, international students were in fact at higher risk for more severe somatic symptoms.

Again, resilience was not found to be a significant predictor of the diagnosis of somatoform disorder, and in the regression model when including the main effects of the predictors this construct did not reach significance levels. As stated before, the effect of the covariates in the model as well as social desirability may have contributed to these results.

Regarding extraversion, some studies have suggested that there is a positive association between extraversion and healthy behaviors (Rhodes & Smith, 2006), lower risk of death (Wilson, et al., 2005) and better outcomes of unexplained somatic symptoms (De Gucht, et al., 2004). However, the findings of the present study indicated that extraversion was not a significant predictor of somatoform disorder or of the severity of somatic symptoms when other variables were held constant. This is in line with other studies that have found that positive affect is unrelated to health complaints (Watson & Pennebaker, 1989).

The final regression model for somatoform disorder explained between 15.2% and 27.7% of the variance. For the severity of somatic symptoms, the final model explained 49.1% of the variance for international students and 45.6% for German students. Although several significant predictors were found, the results indicated that especially for the diagnosis of somatoform disorder, there is still a large amount of variance that could not be explained. Further studies should explore other possible risk and protective factors involved in the development of this mental disorder among student populations.

5.5.3 Anxiety disorder and severity of anxiety symptoms

The results indicate that higher neuroticism, higher stress levels and the status of international student were significant predictors of the diagnosis of anxiety disorder. The effect of the studied predictors did not differ between international and German students.

Significant predictors of the severity of anxiety symptoms were female gender, lower age, the status of international student, higher neuroticism, higher stress levels, and more traumatic life events. Only the effect of age on the severity of anxiety symptoms differed significantly between international and German students.

Neuroticism was a core predictor of the diagnosis of anxiety disorder and of the severity of anxiety symptoms, supporting the hypothesis that students with higher neuroticism were at higher risk for these two outcome variables. As shown earlier, these results are not surprising considering that it has been previously suggested that neuroticism is one of the strongest and broadest predictors of psychopathology (Watson, et al., 2006). These results are consistent with a large body of research that has also shown this positive association. The meta-analysis conducted by Kotov et al. (2010) also found a strong relationship between neuroticism and all anxiety disorders. Similarly, higher neuroticism has been associated with generalized anxiety disorder and anxiety symptoms (Kendler & Gardner, 2011; Khan, et al., 2005). The association between neuroticism and anxiety disorders or anxiety symptoms can be easily derived by looking at the definition of the concept and the characterization of individuals with higher neuroticism scores. The predisposition to experience anxiety has been described as a component of this personality domain (Costa, et al., 2001) which also includes one facet called “anxiety”. Furthermore, individuals high in neuroticism report being easily upset and overwhelmed, being frequently worried and nervous (Borkenau & Ostendorf, 1993).

As hypothesized, students with higher stress levels were at higher risk for the diagnosis of anxiety disorder and for the severity of anxiety symptoms. The positive association between stress and anxiety disorders, especially generalized anxiety disorder, has been well documented (Brantley, et al., 1999; Muhsen, et al., 2008; Newman & Bland, 1994). The findings of the present study are compatible with other studies that have suggested that stress is an etiological factor for generalized anxiety disorder and is associated with a higher risk for this diagnosis [please see (Gosselin & Laberge, 2003) for a review].

These findings are particularly relevant considering that for both international and German students, stress was found to be a main predictor not only of the diagnosis of anxiety disorder but also of most of the diagnoses included in the present study. Importantly, stress was also a significant predictor of the severity of depressive, somatic and anxiety symptoms. Consequently, in order to reduce the risk for mental disorders and the development of severe symptomatology among university students, interventions aimed at reducing stress levels should be implemented.

The results also supported the hypothesis that international students were at higher risk for anxiety disorder as well as for more severe anxiety symptoms. In fact, international students were almost two times more prone to meet diagnostic criteria for anxiety disorder compared to German students when regression analyses were conducted. Again, if only differences in the prevalence rates and symptom severity were examined, this may lead to the wrong conclusion that international students were not at higher risk for anxiety disorders or anxiety symptoms.

Few previous studies have shown high rates of anxiety and psychiatric symptoms among international students (Bhugra, 2004; Furukawa, et al., 1998), but they did not compare this population with domestic students. The present work therefore contributes to the body of evidence showing that international students are at higher risk for anxiety disorder and anxiety symptoms than domestic students.

Female gender was a significant predictor of anxiety symptoms but not of the diagnosis of anxiety disorder. The effect of gender did not differ for anxiety disorder or anxiety symptoms between international and German students. Several previous studies have shown a significant association between female gender and anxiety disorders (Mackinaw-Koons & Vasey, 2000). Women have a higher risk for the diagnosis of generalized anxiety disorder in the general population (Jacobi, et al., 2004; Wittchen, et al., 2011) as well as in samples of university students (Bailer, et al., 2008; Eisenberg, Gollust, et al., 2007). Besides anxiety disorders being

more prevalent among females, it has been suggested that they are more disabling among this group (McLean, Asnaani, Litz, & Hofmann, 2011). The lack of association between female gender and the diagnosis of anxiety disorder in the present study may be due to the fact that the symptoms assessed by the PHQ are not exactly the same as the ones included for the full diagnosis according to the DSM-IV. Additionally, the DSM-IV specifies a time frame of at least six months whereas the time frame used in the PHQ is only four weeks. The higher risk of female students for anxiety symptoms found in the present study is consistent with previous research that has shown that, on average, higher levels of anxiety symptoms are reported by girls and women (Mackinaw-Koons & Vasey, 2000). However, research exploring possible explanations for gender differences in anxiety and specifically its etiology are almost nonexistent (Leach, Christensen, Mackinnon, Windsor, & Butterworth, 2008), particularly regarding the possible role of psychosocial factors (Leach, et al., 2008).

The current results also indicated that lower age was a significant predictor of the severity of anxiety symptoms but not of the diagnosis of anxiety disorder. Further analysis indicated that the effect of age was significant only in the sample of international students and not in the sample of German students. It can be hypothesized that compared to Germans, the process of adaptation and transition may be especially difficult for this group. Young international students at the beginning of their studies have to face not only the process of adaptation and transition to university, but also are forced to endure a stressful and challenging process of adaptation to a new country and a new culture which may be responsible, at least in part, for higher levels of anxiety symptoms among this population.

The results of this study also support the hypothesis that students who have experienced more traumatic life events were at higher risk for more severe anxiety symptoms. However, the number of traumatic life events was not a significant predictor of anxiety disorder. The effect of traumatic life events on anxiety disorder and anxiety symptoms did not differ between international and German students. Although previous research has focused on the diagnosis of posttraumatic stress disorder, several studies have also reported a significant association between traumatic events and generalized anxiety disorder (Brawman-Mintzer, et al., 2005; Ghafoori, et al., 2009; Neria, et al., 2010; Roemer, et al., 1996). The lack of association between traumatic events and the diagnosis of anxiety disorder in the present study may be influenced by methodological aspects, as only the experience of possible traumatic life events was examined and no further information about the frequency, age at which those events were experienced, or the elicited emotional response due to these events was assessed.

The personality trait of extraversion was neither a significant predictor of the diagnosis of anxiety disorder nor of the severity of anxiety symptoms. The effect of this predictor did not differ between international and German students. Although it has been previously indicated that extraversion and generalized anxiety disorder might be strongly associated (Kotov, et al., 2010), this result has not always been supported (Khan, et al., 2005). The current results suggest that among international and German students, other variables (e.g. neuroticism, stress) are better predictors of anxiety disorder and the severity of anxiety symptoms.

Social support was not a significant predictor of anxiety disorder or of the severity of anxiety symptoms, which did not support the hypothesis that students with lower social support would be at higher risk for these outcome variables. The results also revealed that the effect of social support did not differ between international and German students. The role of social support in the development of anxiety has been less studied than, for example, in depression. Some studies have suggested a negative association between social support and anxiety (Hefner & Eisenberg, 2009; Zimmerman, et al., 2000), but others have not found a significant association with generalized anxiety disorder (Maulik, Eaton, & Bradshaw, 2011).

Contrary to the expectations, resilience did not predict the diagnosis of anxiety disorder or the severity of anxiety symptoms. As stated before, this could be explained due to particular characteristics of the samples, due to the fact that other variables play a more important role as predictors, or due to the impact of social desirability affecting the way students answered the questionnaire.

The final model for the diagnosis of anxiety disorder explained between 10.1% and 32.6% of the variance. This model explained a larger portion of the variance for the severity of anxiety symptoms (50.2% for international students and 48.8% for German students). Further studies may contribute to examining the role of other variables not included in the present study in relation to anxiety disorders and symptoms among the general population of university students, and among international students.

5.6 Predictors in the sample of international students

In addition to the previously discussed predictors of mental disorders and severity of symptoms, the role of variables related to the condition or situation of international students was examined, including: months being in Germany, having someone to help upon arrival in Germany, actual knowledge of the German language, number of problems related to the condition of international students (e.g. problems with visa, discrimination), homesickness, worrying about problems in the home country, frequency of seeing the family and frequency of being in contact with the family (e.g. email, phone calls). All of these variables were controlled for previous predictors (e.g. gender, neuroticism, etc).

The results revealed that the length of stay in Germany was positively associated with the diagnosis of other depressive disorder. This finding contradicts an earlier study including a sample of Asian and Latin American international college students in the U.S. that showed a negative association between length of stay in the foreign country and psychological distress symptoms (Wilton & Constantine, 2003). Although that study did not assess depressive symptoms, it showed that higher distress is experienced by international students at the beginning of their stay abroad which may also lead to higher depressive symptomatology. However, in concordance with the results of the current study, similar results were described regarding the "healthy migrant" effect, that refers to the phenomenon that immigrants are often healthier compared to the population born in the host country. Although at the beginning migrants show better health outcomes, it has been described that over time and as acculturation and length of stay in the host country increases, the health status of migrants declines - what Rumbaut has called the "paradox of assimilation" (Rumbaut, 1997). It has also been hypothesized that this deterioration is related to the adoption of unhealthy cultural practices in the host country, leaving behind protective health practices from their cultures (Franzini & Fernandez-Esquer, 2004). In fact, some studies have indicated an association between acculturation and psychological distress (Kaplan & Marks, 1990), cigarette smoking (Haynes, Harvey, Montes, Nickens, & Cohen, 1990), drug abuse, alcohol consumption, worse nutrition and dietary patterns and worse birth and perinatal outcomes (Lara, Gamboa, Kahramanian, Morales, & Bautista, 2005).

Another significant predictor of the diagnosis of other depressive disorder was being more frequently in contact with the family. In contrast, the frequency of seeing the family was negatively associated with the diagnosis of anxiety disorder. In this sense, it can be hypothesized that for international students, seeing the family helps against anxiety as the

family might act as a source of support and protection while being abroad. This idea is not necessarily contradictory to the fact that being more frequently in contact with the family was significantly related to the diagnosis of other depressive disorder, as it is possible that international students who are feeling more depressed have the need to be in contact with their family members more frequently.

Related to the preceding point, higher levels of homesickness among international students were associated with more severe somatic symptoms. In the literature, five factors of homesickness have been identified: missing family, missing friends, having adjustment difficulties, ruminations about home and feeling lonely (Stroebe, van Vliet, Hewstone, & Willis, 2002). International students have been found to be more likely to feel lonely and homesick compared to domestic students (Rajapaksa & Dundes, 2002-2003), factors that have been conceptualized as an acculturative stressor (Wei, et al., 2007; Ying, 2005). Homesickness has been linked to mental health disorders, especially to depression in both domestic and international students (Constantine, Okazaki, & Utsey, 2004) and to somatic complaints such as gastric complaints, appetite loss and headache (VanTilburg, Vingerhoets, & VanHeck, 1996).

In the current study, a higher number of problems or stressors faced by international students (e.g. difficulties with the German culture and language, with the organization of the university or with integration) were positively associated with the diagnosis of somatoform disorder, severity of somatic symptoms and with the severity of anxiety symptoms. These findings are consistent with previous research that has shown a significant association between stress and psychiatric disorders (Cohen, et al., 2007), somatic symptoms (Cohen, et al., 1997; Steinbrecher & Hiller, 2011) and anxiety (Brantley, et al., 1999; Gosselin & Laberge, 2003).

5.7 Course of symptom severity

A main aim of the study was to examine the role of potential predictors of the course of depressive, somatic and anxiety symptoms (severity of symptoms at T2) and to explore the differences between international and German students. Multiple linear regressions were conducted including observed (i.e. status international or German student, age, gender, traumatic life events, stress at T1, stress at T2, symptom severity at T1, negative and positive life experiences) and latent variables (i.e. neuroticism, extraversion, social support and resilience measured at T1).

Three models were tested for each outcome variable. The results regarding the main effects of predictors will be mainly discussed based on the first model in which only the main effects were tested. The results of the differences in the effect of the predictors between samples will be mainly discussed based on the final model.

Regarding depressive symptoms, the results showed that higher current stress levels and more severe depressive symptoms at T1 were significant predictors of the severity of depressive symptoms at T2. Additionally, more severe depressive symptoms at T2 were associated with lower stress levels at T1, higher scores of negative life experiences and lower scores of positive life experiences. The results of the interaction terms indicated that the effect of predictors did not differ between international and German students.

For the severity of somatic symptoms at T2, female gender, lower neuroticism, a higher severity of somatic symptoms at T1, higher current stress levels and higher scores of negative life experiences were found to be significant predictors. Although the effect of the number of traumatic life events differed between international and German students, this variable was neither a significant predictor for international students nor for German students.

The results of the regression analyses on the severity of anxiety symptoms at T2 indicated that female gender, lower stress levels at T1, higher anxiety symptoms at T1, higher actual stress levels and higher scores of negative life experiences were significant predictors of this outcome variable. Furthermore, the effect of age differed between samples. While lower age was a significant predictor of more severe anxiety symptoms in the sample of international students, this variable had no significant effect in the sample of German students.

The results showed that one of the main predictors of the severity of symptoms at the follow-up assessment was previous symptom severity. In other words, the more severe the symptoms were at T1, the higher was the risk for more severe symptoms at T2. Furthermore, the effect of the severity of symptoms at T1 did not differ between international and German students. These findings were valid for all of the outcome variables including depressive, somatic and anxiety symptoms. In the case of depressive symptoms, previous longitudinal studies have repeatedly described that severity of depressive symptoms at baseline are strongly associated with the course of depressive symptoms or depressive disorders at the follow-up. Depression severity has been found to be a major predictor of the course of depression in the general population (Spijker, et al., 2002), in clinical samples (Kennedy, Abbott, & Paykel, 2003; Melartin, et al., 2004; Spinhoven, Elzinga, Hovens, et al., 2011) and in primary care patients (Riihimaki, Vuorilehto, Melartin, & Isometsa, 2011). Similar results have been described for

anxiety disorders. For example, in a sample of primary care patients who met the diagnostic criteria for anxiety disorder, results of multivariate analyses revealed that the baseline symptom severity was the only significant predictor of a poor outcome at the follow-up (van Beljouw, Verhaak, Cuijpers, van Marwijk, & Penninx, 2010). Among patients with anxiety disorder, the symptom severity at baseline was also a strong predictor of anxiety disorder at the 2-years follow-up (Spinhoven, Elzinga, Hovens, et al., 2011). Regarding somatic symptoms, the results from a longitudinal study assessing multisomatoform disorder (defined as the presence of three or more bothersome, medically unexplained symptoms) in primary care patients indicated that patients with this diagnosis at baseline were less likely to experience symptom improvement at the 2-week and 3-month follow-up sessions. Furthermore, patients with multisomatoform disorder at baseline were at higher risk of meeting the criteria five years later (Jackson & Kroenke, 2008). Most of the studies that examined the course of depressive, somatic and anxiety symptoms or disorders in association with severity of symptoms at baseline were conducted with clinical samples or with the primary care population. Consequently, the present study increases the body of research by exploring this association (among other predictors) in a large population of international and German university students. An additional advantage of including the severity of symptoms at T1 is that the effect of other predictors included in the analyses was examined while accounting for initial symptom severity.

Along with the severity of symptoms at T1, the current stress level at T2 as assessed by the PHQ was one of the main predictors of the severity of depressive, somatic and anxiety symptoms at T2. Students who reported higher stress were at higher risk for more severe symptoms, even controlling for the covariates included in the models. Furthermore, the effect of current stress at T2 did not differ between international and German students. These findings show that perceived stress is not only a significant predictor of the development of symptoms but also of their course over time. At the follow-up, two measures of stress were used. First, the PHQ assessed stress by including questions regarding ongoing stressors which can be more related to chronic stress (e.g. difficulties with one's partner, financial problems or worries). Secondly, episodic stress or discrete life events (e.g. failing an important exam, change of residence) were also evaluated using the LES. The higher effect of stress on the course of symptoms, as assessed by the PHQ, is consistent with the results from a previous longitudinal study including a large sample of outpatients. According to this study, less improvement of depressive symptoms was found among patients who reported higher levels of chronic stress at the follow-up. However, no association was found between episodic stress

and symptom improvement (Brown & Rosellini, 2011). Yet, in the present study, negative life experiences were also significant predictors of symptom severity at T2. The fact that higher scores of negative life experiences between T1 and T2 were also a significant predictors of more severe depressive, somatic and anxiety symptoms at the follow-up emphasized the role of stress as a core predictor of the course of mental health. The significant effect of negative life events on the course of mental disorders has also been described in other studies. Stressful life events have been associated with the chronicity of somatoform disorders in adolescents (Essau, 2007). The results from a longitudinal study including a large sample of subjects with depressive and anxiety disorder revealed that negative life events predicted depression and anxiety at the 2-year follow-up (Spinhoven, Elzinga, Hovens, et al., 2011). The authors also found that negative life events predicted later remission and the persistence of depressive disorder in participants with depressive disorders, and that positive life events predicted the persistence of depressive disorder. As the results of the present study revealed, the score of positive life experiences was a significant predictor only for the course of depressive symptoms, and the standardized regression coefficients indicated that this effect was much weaker compared to the effect of negative life experiences. Accordingly, it has been suggested that, compared to positive life events, negative life events are stronger predictors of mental health outcomes such as depression (Goodyer, Herbert, Tamplin, & Altham, 2000).

The results also revealed that a lower stress level at T1 was a significant predictor of the severity of depressive and anxiety symptoms at T2. Although there are several studies that have shown a positive association between stress and depression (Hammen, 2005; Kendler, et al., 1999; Leskela, et al., 2006), the results from other studies may give a possible explanation for the finding from the current study. In a study including a large community sample, a negative interaction between chronic and acute stress in relation to depressive symptoms was found, suggesting that chronic stress may reduce the emotional effects of acute stress (McGonagle & Kessler, 1990). According to the authors, these results suggested that high stress, in the form of adversity, may contribute to the development of coping resources enhancing their coping efficacy to subsequent stress. McGonagle & Kessler (1990) also suggested that individuals who were previously under stress would mobilize coping resources more rapidly than individuals who did not experience a prior ongoing stress, and that past experiences of chronic stress can influence the appraisal of subsequent acute stress, so that subsequent stress is appraised as more benign.

As has been described, the severity of symptoms at T1 and the actual stress levels at T2 were markedly the strongest predictors of all outcomes at T2. Their significance may also be

emphasized by the large amount of variance that these models explained: for depressive symptoms, the final model explained 65.4% and 53.8% of the variance in the samples of international and German students, respectively; the explained variance for somatic symptoms was 62.6% in the sample of international students and 55.8% in the sample of German students, and for anxiety symptoms the explained variance was 61.7% in the sample of international students and 42.7% in the sample of German students.

Female gender was found to be a significant predictor of the course of somatic and anxiety symptoms. Previous studies have shown that female gender is related to the chronicity of somatoform disorders among non-referred adolescents (Essau, 2007). It has been also reported that women have a poorer and more chronic course of medically unexplained symptoms (Leiknes, Finset, Moum, & Sandanger, 2007). Besides women having higher prevalence rates of anxiety disorders (Eisenberg, Gollust, et al., 2007; Jacobi, et al., 2004; Wittchen, et al., 2011), gender differences have been described in the course, outcome and treatment course of anxiety disorders (Kinrys & Wygant, 2005; Pigott, 2003). For example, a study examining the predictors of full and partial recoveries from generalized anxiety disorder in primary care patients found that males were more likely than females to achieve a partial recovery (Rodriguez, et al., 2006). Furthermore, a higher symptom severity and more comorbid mental disorders have been found among females compared to males which may result in a more chronic course (Kinrys & Wygant, 2005).

Lower age was also found to be a significant predictor of the severity of anxiety symptoms at T2, but only in the sample of international students. The same significant interaction was found at T1 indicating that lower age is an important predictor among international students not only for the development of anxiety symptoms but also for their course over time. These results indicated that among this group, and in relation to the severity of anxiety symptoms, younger international students may need special attention.

The status of being an international student was not found to be a predictor of the course of depressive, somatic or anxiety symptoms. That is, international students showed a higher risk for the development of more severe symptoms (T1), but over time the effects of other variables play a more significant role. Furthermore, except for the effect of age on anxiety symptoms and the effect of traumatic life events on somatic symptoms (that was not found to be a significant predictor in both samples), no significant differences were found between international and German students, showing that predictors have similar effects in both populations studied.

Neuroticism, which was found to be one of the main predictors at T1, predicted only the course of somatic symptoms. Here, a lower score of neuroticism was significantly associated with more severe symptoms. Although this association showed a direction that may be contrary to the expected one, it should be considered that the significance value was borderline (p = .048) and that this variable was assessed only at T1. Future longitudinal studies should closely explore the association between somatic and psychosomatic symptoms and this personality trait. For its part, extraversion was not a significant predictor of the course of depressive, somatic and anxiety symptoms. Earlier studies have shown mixed results regarding the association between personality traits and the outcomes or course of mental disorders. On one hand, initial level of neuroticism has been associated with less improvement in anxiety disorders (Brown, 2007). A review examining the relation between positive and negative emotionality and the longitudinal course of MDD found that higher levels of negative emotionality measured at the trait level and lower levels of positive emotionality predicted a poorer course of the disorder (Morris, et al., 2009). On the other hand, several studies did not find a significant association between neuroticism and poorer outcomes for depression and depressive symptoms (Brown & Rosellini, 2011; Petersen, et al., 2002). A follow-up study in primary care patients showed that neuroticism was not a significant predictor of the persistence or the prospective increase in the number of medically unexplained symptoms if psychological distress was included in the model (De Gucht, et al., 2004). Additionally, it has been described that the effect of extraversion and neuroticism on the course of depressive and anxiety symptoms was significantly reduced when controlling for baseline severity (Spinhoven, Elzinga, Roelofs, et al., 2011). Likewise, in the present study, the inclusion of the severity of symptoms at T1 as well as current stress levels may have contributed to a reduction not only in the effect of neuroticism and extraversion, but also in the effect of other variables. Finally, it is important to consider that neuroticism and extraversion were assessed only at T1. Although some authors have suggested that personality traits are relatively stable (Watson & Humrichouse, 2006), it has also been described that large changes in personality occur in young adulthood (Roberts, et al., 2006). Therefore, it is possible that the neuroticism and extraversion scores at T1 may not completely reflect the scores at T2, which may have influenced the results.

The results also showed that social support was not a significant predictor of any of the outcome variables at T2. Previous studies have indicated that there is a significant association between higher social support and higher remission rates of depression (Nasser & Overholser, 2005) and the prospective outcome of depressive symptoms (Leskela, et al., 2006). Just as for

neuroticism and extraversion, social support was measured only at T1. Consequently, perceived social support may have changed between T1 and T2, limiting the interpretation of the results.

Resilience was not found to be a significant predictor of the course of symptoms at the follow-up, although the definition of this concept refers to personal characteristics that contribute to the achievement of positive outcomes despite adversity. Therefore, it could have been expected that resilience would have influenced the severity of symptoms at T2. However, resilience was neither a significant predictor of mental disorders or symptoms severity at T1, nor of the course of symptoms over time. Possible factors that may have influenced these results are the assessment of resilience only at T1, the robust effect of covariates included in the regression models, and/or the effects of social desirability.

Although the number of traumatic life events was a significant predictor of some outcome variables at T1, it was not associated with the course of symptoms over time. As stated before, only the experience of traumatic events was assessed and no further information such as the emotional response was examined. The large effect of other variables included in the analysis may also have influenced these results.

5.8 Strengths and limitations of the study

Strengths

The present study examined the mental health of international university students and the risk and protective factors associated with the development and maintenance of mental disorders and symptom severity in this population. The main motivation to conduct this study was the lack of information concerning the mental health of international students, despite the fact it has been suggested that this population might be at high risk for the development of mental disorders. In Germany, in spite of the high rates of student immigration and the potential economic, social and labor impact of mental pathology, studies on the mental health of this population are almost nonexistent. With this lack of information, it is naturally impossible to develop programs for evidence-based mental health promotion. Therefore, the present study offers new and relevant information about the prevalence of common mental disorders among the population of university students and, more specifically, among international students. Additionally, the comprehensive examination of several predictors associated with the

development and course of mental disorders and with the severity of symptoms can provide guidelines for the development of programs for prevention and treatment.

A major contribution of the present study is the inclusion of a reference group of German students. Most of the previous research assessing the mental health of international students has focused only on this specific population and has not included a reference group of domestic students. Without a reference group it is not possible to explore differences in the prevalence rates of mental disorders and in the effect of predictors, or to conclude that international students are, in fact, at higher risk than domestic students.

A large number of the few research studies that have examined the mental health of university students have focused only on a particular group of students (e.g. medical or nursing students). This is also the case of studies including samples of international students. For example, some of these studies have assessed the mental health of international students from the same country of origin. In comparison with previous research, the samples of international and German students in this study were not limited to a specific group, but focused on the whole population.

Linked to the preceding point and in relation to the characteristic of the samples, an important advantage of the present study over previous research is the large size of the samples. First, it has been described that bigger samples are more likely to reflect the whole population (Field, 2009), providing more accurate data. Additionally, large samples offer the possibility to closely analyze some segments of the data (e.g. males compared to females), which is more difficult if the sample is small.

A further strength of the study is the scope of the collected data. The relevant data was assessed including demographic information, actual treatment and medication, diagnoses of common mental disorders, severity of symptoms, and information about their predictors as well. Several of these predictors have been previously examined in clinical or primary care samples, however this study is one of the very few that has evaluated these predictors among university students. Moreover, the study included not only a cross-sectional design but also a longitudinal assessment. The follow-up assessment offered the opportunity to examine the course of symptoms over time and to explore the role of possible predictors.

The complexity of the statistical analyses is another positive aspect of the present study. In the first place, the factorial validity of measurement instruments for the assessment of latent constructs was examined. Furthermore, to make meaningful comparisons between different groups based on latent constructs, it is important to test the degree to which the measurement

instruments assess the same attribute across groups, that is, to test for measurement invariance. Although this should always be examined when groups are compared, very few previous studies have included measurement invariance analyses. The fact that in the current study requirements for partial or full scalar invariance of latent constructs were met, assures that differences between samples represent "real" differences. Secondly, the analyses conducted using structural equation modeling have the advantage of correcting for measurement error, and offers the possibility to conduct the analysis at follow-up including all data available, meaning that for the regression analyses at T2 data from participants who took part only at T1 was considered.

Limitations

The study has limitations inherent to epidemiological studies of this kind. Regarding cross-sectional designs, outcome variables and predictors are assessed at the same point in time, [please see (Jablensky, 2002)] and there is limited control over the reliability and validity of the data (particularly when the data is retrospective). This limitation is more pronounced when the data is not directly assessed by an interviewer, as in the present study which utilized an online survey. Furthermore, the results based on self-reports might be different than the ones based on semi-structured interviews conducted by an expert or trained interviewer. The second limitation of studies of this kind is the difficulties in establishing cause-effect inferences. Therefore, the results have to be interpreted with caution.

However, the present study included some mechanisms that aimed to reduce the impact of these potential limitations. For example, the measurement instruments used for the assessment of the outcome variables and predictors have been validated and are widely used in research. Additionally, the software used for the development of the online survey allows the identification of participants who simply "click-through" (e.g. submitting invalid answers). Furthermore, including two student samples (international and domestic students) allows the comparison of the results between them, even in the presence of bias or artifacts (produced during the collection of the data) that might have affected both samples equally.

On the other hand, although the present study included large samples of international and German students, they are not necessarily representative of entire student body of the university students. International students were contacted at two popular universities in Germany, and German students were contacted only at one university. These institutions are situated in the same federal sate and may have certain characteristics (e.g. high academic

level) that might differentiate them from other universities. Therefore, the data obtained in the present study may not necessarily be representative of all universities, limiting the generalizability of the present findings. Furthermore, for both T1 and T2, a greater number of female students than male students took part. Although more women are enrolled at both universities, a bias towards female gender might be present in this study, especially at the follow-up. Additionally, it is important to consider the sample selection. Because there was no control of who took part in the present study and who did not, some unknown selection effects may be present. For example, it is possible that students with ongoing mental disorders or symptoms may have had more interest in participating in the survey.

Although the large sample size included in the present study is a strength of the design, the size of the sample at the follow-up was significantly smaller. However, regression analyses for the severity of symptoms at T2 were conducted using structural equation modeling, a method that has the advantage of using all data available, including data from participants who took part only at T1.

A further limitation of the study is that several predictors of mental disorders and for the severity of symptoms were assessed only at T1, limiting the interpretation of their effect on the outcome variables at T2. For example, scores of social support that were measured only at T1 were used for regression analyses at T2. However, social support may have changed during this period, as for example due to the gain of new friends or due to the beginning of a new relationship.

The assessment of mental disorders in the present study also presented some particular aspects to consider. The PHQ is a widely used screening instrument for mental disorders that has proven to be a valid, effective, and well accepted instrument (Grafe, Zipfel, Herzog, & Lowe, 2004). However, for some diagnoses such as somatoform disorder, further information needs to be collected and in some cases evaluation by a medical doctor or a specialist is required. Furthermore, subthreshold mental disorders were also included, meaning that not all the diagnostic criteria were assessed. Therefore, interpretation of these findings should be done with caution.

5.9 Conclusions and future directions

The findings from the present study revealed that mental health is a real problem among this population of university students. Both international and German students had high prevalence rates of depressive, somatoform and anxiety disorders. Contrary to the expectations, international students did not have higher prevalence rates of mental disorders compared to German students and did not differ in the severity of depressive, somatic and anxiety symptoms. On the other hand, despite the high prevalence rates in the present study, a minority of the students suffering from a mental disorder were receiving psychiatric or psychological treatment. This pattern of underutilization of mental health services was significantly more prominent for international students. International and German students also differed in the scores of the assessed predictors of mental disorders, revealing that each sample has particular characteristics. Regarding personality traits, international students showed significantly lower neuroticism and extraversion scores than German students. As anticipated, lower social support and higher stress levels were found among international students. Furthermore, international students reported the experience of more traumatic life events in the past and higher scores of negative life experiences. While female gender was associated with the development of somatic and anxiety disorders and a poorer course of somatic and anxiety symptoms, as well as with somatoform disorder, male students had a higher risk for MDD and more severe depressive symptoms at T1. For its part, younger international and German students were at significantly higher risk for several negative mental health outcomes.

If only the prevalence rates of mental disorder were examined, it could be erroneously concluded that international students are not at higher risk for mental disorders. However, the results of the regression analyses showed that in fact, international students have a higher risk for almost all of the assessed mental disorders and for more severe depressive, somatic and anxiety symptoms compared to German students. Additionally, stress and especially neuroticism stood out as core predictors of mental diseases at T1 in both groups. Therefore, the fact that international students had significant lower neuroticism scores may have contributed to the lack of differences in the prevalence rates of mental disorders among the two student populations. When the effect of neuroticism was held constant, the higher risk of international students became more evident.

Although the status of being an international student conferred a higher risk for the development of mental disorders and for more severe symptoms, this status was not a significant predictor of a poorer course of symptoms over time. In fact, the results revealed that the two main predictors of more severe symptoms at T2 were the previous symptom severity and the current stress levels.

The findings of the present study revealed that mental health disorders are a prevalent and important problem not only among international students but also among German students. Importantly, the age of onset for many mental disorders coincided with the age of the studied population (Andrade, et al., 2003; Kessler, et al., 2005). If not properly treated, most of these mental disorders tend to adopt a chronic and recurrent course. Furthermore, mental disorders are one of the major causes of burden of disease in the world (World Health Organization, 2008), and are associated with several negative outcomes (Andrews & Wilding, 2004; Kessler, Foster, Saunders, & Stang, 1995; Kessler, Walters, & Forthofer, 1998; Weitzman, 2004). Therefore, the results of the current study strongly indicate that the prevention, detection and adequate treatment of mental disorders among university students should be a central priority. The significance of the severity of previous symptoms as a predictor of the course of psychiatric symptoms found in the present study also emphasizes the necessity of interventions aimed to prevent the development of severe symptomatology as well as the importance of appropriate treatment.

In this sense, the role of university institutions can be crucial. Universities are entities particularly suited to promote mental health among students due to the fact that they play a central role in several important aspects of the lives of the students. As stated before, the findings of the present study revealed that most of the students who met criteria for mental disorders were actually not receiving mental health treatment, although many of them had the perception that they would need some kind of psychological assistance, in concordance with other studies (Eisenberg, Golberstein, & Gollust, 2007). Therefore, it would be important to examine more closely which are the factors that are acting as barriers to the mental health services among these populations (e.g. lack of information about service options, unmet needs for services, stigma of mental illness), to evaluate the actual offer provided by the universities, and create strategies to improve access to mental health services. Because less international students were receiving mental health treatment compared to German students, factors limiting their access to mental health services should be a special focus of interest for future studies. If the needs and conceptions of treatment are different among international and

domestic students (hypotheses that need to be tested in the future), special programs focused on the population of international students should be offered.

Besides the improvement of the use of mental health services among international and German students, prevention and early detection of mental disorders should be a high priority. Future research increasing the knowledge about the actual needs of students can give some direction for developing programs aimed at promoting mental health among university students and for decreasing the risk for mental disorders. For example, workshops or group programs for the general population of students as well as especially for international students could be offered at the university. Furthermore, younger university students are a group at high risk among university students and therefore may require special attention. Taking into account that stress was an important predictor of both the development of mental disorders and the course of symptoms, programs could be developed to actively detect stress sources among students, and to provide coping and stress-relief strategies.

The study also revealed that daily life problems related to adaptation to the host country were associated with an increased risk for mental disorders. Most of these issues can be easily resolved with proper support from the university, and therefore should be a priority target of future programs for preventing mental disorders among international students.

Findings from the present study increase the limited knowledge about the mental and physical health of university students, and more specifically about the population of international students and the protective and risk factors for mental disorders in these populations. However, the study has some methodological limitations which can be improved in future studies, and the results open new questions that need to be address.

In the first place, although the present study included samples of international and German students that are larger than several previous studies, they are not necessarily representative of the entire population of university students. Therefore, studies including samples from different universities in Germany and/or different countries should be conducted.

Even though the study included two groups of university students (international and domestic), further studies could also include a sample of young adults not enrolled at the university, to further clarify the degree in which the results of this study are related to the condition of being enrolled at the university.

Regarding the population of international students, it could be of interest to explore whether the higher risk for developing mental disorders and for more severe symptoms is related only to the status of being an international student or if other variables not assessed in the present study also play a role. Moreover, future research should include prospective studies assessing mental health and related variables among international students also before leaving their home country. The assessment of pre-migratory risk and protective factors of mental health before departure could give important clues to better understand the characteristics of international students and the factors associated to the development and course of mental disorders.

6 References

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7 Appendix

Appendix A

Online survey T1

EBERHARD KARLS
UNIVERSITÄT
TÜBINGEN

Welcome and thank you for your interest!

Your response is extremely valuable to increase our knowledge about the situation of international students in Germany and to design strategies for the difficulties that they face. Surely, in this survey there are some personal questions, but please be assured that your responses will be completely anonymous and confidential. The entire survey takes approximately 20-30 minutes to complete. As we appreciate your time, by completing the survey you will have the possibility of winning one of 3 prizes:

1. 200 Euro
2. 120 Euro
3. 80 Euro

After answering the questions you can send an e-mail to the address that appears at the end of the survey in order to participate in the raffle. Your email address is therefore not attached to your survey responses and they remain anonymous. Participation in the raffle takes place after a plausibility test of the survey data. Participation in this survey is voluntary.

Please read carefully the following instructions:

- This study is about your individual experiences. There are no right or wrong answers.

- Once you start answering the survey you should complete it until the end. It is not possible to save part of the data and continue later.

- When responding the survey, **DO NOT** use the "Back" button on your computer. Closing the browser or using the "Back" button to return to a previous screen will result in data loss.

- If you are ready to start, press NEXT

Next

Please give your Personal Code
(6-digit personal code for research purposes)

Your personal code consists of the first letter of your birthplace, the first letter of your first name, and the day and month of your birthday.

Example:

If you were born in **W**ashington, your name was **D**avid, and you were born on the **22**th of July(**07**): **WD2207**

Next

Sex

- male
- female

Age

Years

Nationality (country)

Marital Status

Please choose

Do you have children?

- Yes
- No

Which religion do you practice?

Please choose

Next

At what university do you study?

- Eberhard-Karls-University Tübingen
- Other

Are you currently part of an exchange or mobility program (such as Erasmus)?

- No
- Yes. Which?

Which degree are you pursuing at your current university?

Please choose

Field of study

Please choose

Other

How satisfied are you with your choice of study?

Please choose

Next

In which semester are you now?

Please choose

Since how many semesters are you studying in Germany?

Please choose

	Years	Months
How long have you been living in Germany?	Please choose	Please choose

Upon arrival, did you know somebody in Germany who helped you with the first steps?

- Yes
- No

Have you ever been in Germany before?

- Yes
- No

Have you ever lived abroad before?

- Yes
- No

Next

Where do you live?

Please choose

Other

With whom do you live?

Please choose

Other

With whom do you spend most of your time (privately and at the university)?

Please choose

Monthly income

Euro

Main financial source
Please select the most important source

Please choose

Next

	Now better	Equal	Now worse
How would you rate your academic performance now in comparison to before arrival in Germany?			

	Very good	Good	Moderate	Bad	Very bad
How would you rate your german knowledge before arrival?					
How would you rate your current german knowledge?					
How would you rate the support from the university when you have problems?					

Next

Since you are in Germany, did you have the following problems?

	Yes	No
Acceptance to university	○	○
Visa	○	○
Acknowledgement of school and academic achievements	○	○
Finding a room / an apartment	○	○
Financing	○	○
Health Insurance	○	○
Organisation of the university	○	○
Communication in german	○	○
Independent housekeeping	○	○
Integration	○	○
German culture and mentality	○	○

If you had other problems, please state

How would you rate these problems now?

- ○ I have no / few problems
- ○ I have moderate problems
- ○ I have great problems

Next

	Very strong	Strong	Moderate	Weak	Nonexistent
How intensely would you rate your current homesickness?	○	○	○	○	○
How much do you worry about problems at home in your home country (such as problems in the family)?	○	○	○	○	○

	Several times a week	Several times a month	Every few months	Less than that
How often do you see your family?	○	○	○	○
How often do you talk to your family (e.g. email, telephone, skype)?	○	○	○	○

Next

The following statements refer to your relationships with people that are important to you, that is to say, your partner, family members, friends, acquaintances, colleagues and neighbours. These questions deal with how you experience and appreciate these relationships.

Beside each statement you will find five circles. Please mark the circle which mostly resembles your own accordance with the statement. A mark in the outer right circle ("totally applicable"), for example, would mean that the statement is true for you, whereas a mark in the second column from the left would mean that the statement is only rarely applicable for you.

Please answer the questions considering your current situation in Germany.

	Not at all applicable	Rarely applicable	Moderatly applicable	Applicable	Totally applicable
I have no problems finding someone to look after my apartment while I am away	○	○	○	○	○
There are people who accept me the way I am - without limitations	○	○	○	○	○
I receive a lot of understanding and security from other people	○	○	○	○	○
I have someone who is very close to me and on whom I can always rely for help	○	○	○	○	○
If necessary I can always borrow something from friends or neighbours without problems	○	○	○	○	○

Next

	Not at all applicable	Rarely applicable	Moderatly applicable	Applicable	Totally applicable
I have friends/relatives who always take time to look after and listen to me, when I want to unburden	○	○	○	○	○
I know several people with whom I enjoy getting together	○	○	○	○	○
I have friends / relatives who sometimes just hug me	○	○	○	○	○
When I am sick I can ask friends/relatives, without hesitating, to do important things for me	○	○	○	○	○
I know just who to talk to if I am very troubled	○	○	○	○	○
There are people with whom I share joys and sorrows	○	○	○	○	○
I have friends/relatives with whom I can just be spontaneous and playful	○	○	○	○	○
I have a trusted person in whose company I feel absolutely comfortable	○	○	○	○	○
There is a group of people (group of friends, clique) that I belong to and meet with regularly	○	○	○	○	○
In general I am satisfied with my social life in Germany	○	○	○	○	○

Next

The next section consists out of 12 statements, which may be suitable for describing your own person.

Read each statement carefully. For each statement mark the response that best represents your opinion.

There are no "right" or "wrong" answers to the following questions. You best serve the purpose of this survey by answering as truthfully as possible.

Next

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Example:

- Strongly disagree: if you strongly disagree or the statement is definitely false

- Strongly agree: if you strongly agree or the statement is definitely true

	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
I like to have a lot of people around me	○	○	○	○	○
I often feel inferior to others	○	○	○	○	○
I laugh easily	○	○	○	○	○
When I'm under a great deal of stress, sometimes I feel like I'm going to pieces	○	○	○	○	○
I often feel tense and jittery	○	○	○	○	○
I like to be where the action is	○	○	○	○	○
Sometimes I feel completely worthless	○	○	○	○	○
I often feel as if I'm bursting with energy	○	○	○	○	○
I am a cheerful, high-spirited person	○	○	○	○	○
Too often, when things go wrong, I get discouraged and feel like giving up	○	○	○	○	○
I often feel helpless and want someone else to solve my problems	○	○	○	○	○
I am a very active person	○	○	○	○	○

Next

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You have completed half of the survey!

The next section is about **your health**. Please read the questions carefully and pay attention to the different time specifications.

Next

During the last 4 weeks, how much have you been bothered by any of the following problems?

	Not bothered	Bothered a little	Bothered a lot
Stomach pain	○	○	○
Back pain	○	○	○
Pain in your arms, legs, or joints (knees, hips, etc)	○	○	○
Menstrual cramps or other problems with your periods	○	○	○
Pain or problems during sexual intercourse	○	○	○
Headaches	○	○	○
Chest pain	○	○	○
Dizziness	○	○	○
Fainting spells	○	○	○
Feeling your heart pound or race	○	○	○
Shortness of breath	○	○	○
Constipation, loose bowels, or diarrhea	○	○	○
Nausea, gas, or indigestion	○	○	○

Please give the following data:

	kilogram	pound
Weight: in kilogram (kg) or in pound (lb)	[ ] (kg) oder	[ ] (lb)

	centimeter	feet	inches
Height: in centimeter (cm) or in feet (ft) and inches (in)	[ ] (cm) oder	[ ] (ft) und	[ ] (in)

Next

Over the last 2 weeks how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days	Nearly every day
Little interest or pleasure in doing things	○	○	○	○
Feeling down, depressed or hopeless	○	○	○	○
Trouble falling or staying asleep, or sleeping too much	○	○	○	○
Feeling tired or having little energy	○	○	○	○
Poor appetite or overeating	○	○	○	○
Feeling bad about yourself, or that you are a failure, or have let yourself or your family down	○	○	○	○
Trouble concentrating on things, such as reading the newspaper or watching television	○	○	○	○
Moving or speaking so slowly that other people could have noticed? Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual	○	○	○	○
Thoughts that you would be better off dead or of hurting yourself in some way	○	○	○	○

Was there ever in the past a period of 2 weeks or more in which you were depressed, sad and without hope?

○ Yes
○ No

Next

During this period, how often were you bothered by any of the followings problems?

	Not at all	Several days	More than half the days	Nearly every day
Little interest or pleasure in doing things	○	○	○	○
Feeling down, depressed or hopeless	○	○	○	○
Trouble falling or staying asleep, or sleeping too much	○	○	○	○
Feeling tired or having little energy	○	○	○	○
Poor appetite or overeating	○	○	○	○
Feeling bad about yourself, or that you are a failure, or have let yourself or your family down	○	○	○	○
Trouble concentrating on things, such as reading the newspaper or watching television	○	○	○	○
Moving or speaking so slowly that other people could have noticed? Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual	○	○	○	○
Thoughts that you would be better off dead or of hurting yourself in some way	○	○	○	○

Next

In the last 4 weeks, have you had an anxiety attack (sudden feeling of fear or panic)?

- ○ Yes
- ○ No

Over the last 4 weeks, have you been feeling nervous, anxious, on edge, or worrying a lot about different things?

- ○ Not at all
- ○ Several days
- ○ More than half the days

Do you ever drink alcohol (including beer or wine)?

- ○ Yes
- ○ No

Next

In regard to the anxiety attack (sudden feeling of fear or panic), please answer the following questions

	Yes	No
Has this ever happened before the last 4 weeks?	○	○
Do some of these attacks come suddenly out of the blue - that is, in situations where you don't expect to be nervous or uncomfortable?	○	○
Do these attacks bother you a lot or are you worried about having another attack?	○	○

Next

Over the last 4 weeks, how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days
Feeling restless so that it is hard to sit still	○	○	○
Getting tired very easily	○	○	○
Muscle tension, aches, or soreness	○	○	○
Trouble falling asleep or staying asleep	○	○	○
Trouble concentrating on things, such as reading a book or watching TV	○	○	○
Becoming easily annoyed or irritable	○	○	○

Next

Have any of the following happened to you more than once in the last 6 months?

	Yes	No
You drank alcohol even though a doctor suggested that you stop drinking because of a problem with your health	○	○
You drank alcohol, were high from alcohol, or hung over while you were working, going to university, or taking care of children or other responsibilities	○	○
You missed or were late for work, university, or other activities because you were drinking or hung over	○	○
You had a problem getting along with other people while you were drinking	○	○
You drove a car after having several drinks or after drinking too much	○	○

Next

In the last 4 weeks, how much have you been bothered by any of the following problems?

	Not bothered	Bothered a little	Bothered a lot
Worrying about your health	○	○	○
Your weight or how you look	○	○	○
Little or no sexual desire or pleasure during sex	○	○	○
Difficulties with husband/wife, partner/lover or boyfriend/girlfriend	○	○	○
The stress of taking care of children, parents, or other family members	○	○	○
Stress at work outside of the home or at the university	○	○	○
Financial problems or worries	○	○	○
Having no one to turn to when you have a problem	○	○	○
Something bad that happened recently	○	○	○
Thinking or dreaming about something terrible that happened to you in the past – like your house being destroyed, a severe accident, being hit or assaulted, or being forced to commit a sexual act	○	○	○

Next

Do you feel that your current state of health needs psychological or psychiatric treatment?

- ○ Yes
- ○ No
- ○ I am in psychological or psychiatric treatment

Were you ever in psychological, psychiatric or neurological treatment?

- ○ Yes
- ○ No

Do you take medication?

- ○ Yes. Which? _____
- ○ No

Are there in your family (mother, father or sibling) mental illness or nervous breakdowns (including alcohol and drug problems)?

- ○ Yes. What diagnosis was made? _____
- ○ No

Next

The following section contains a number of statements. Please read through each statement and mark how much the statements **generally** apply to you, i.e. how much your usual thinking and action is described by these statements.

	1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree
When I make plans, I follow through with them	○	○	○	○	○	○	○
I usually manage one way or another	○	○	○	○	○	○	○
Keeping interested in things is important to me	○	○	○	○	○	○	○
I am friends with myself (I like myself)	○	○	○	○	○	○	○
I feel that I can handle many things at a time	○	○	○	○	○	○	○
I am determined	○	○	○	○	○	○	○
I keep interested in things	○	○	○	○	○	○	○
I can usually find something to laugh about	○	○	○	○	○	○	○
I can usually look at a situation in a number of ways	○	○	○	○	○	○	○
Sometimes I make myself do things whether I want to or not	○	○	○	○	○	○	○
I have enough energy to do what I have to do	○	○	○	○	○	○	○

Next

The purpose of the next questions is to identify important life experiences that can affect a person´s emotional well-being or later quality of life.

The events listed below are far more common than many people realize.

Please remember that your answers are anonymous.

Next

	Yes	No
Have you ever experienced a natural disaster (flood, hurricane, earthquake, etc.)?	○	○
Were you involved in a motor vehicle accident for which you received medical attention or that badly injured or killed someone?	○	○
Have you been involved in any other kind of accident in which you or someone else was badly hurt?(examples: a plane crash; a drowning or near drowning; an electrical or machinery accident; an explosion, home fire, or chemical leak, overexposure to radiation or toxic chemicals)	○	○
Have you lived, worked, or had military service in a war zone?	○	○
Have you experienced the sudden and unexpected death of a close friend or loved one?	○	○
Has a loved one ever survived a life-threatening or permanently disabling accident, assault, or illness? (examples: spinal cord injury, rape, cancer, life-threatening virus, serious heart condition)	○	○
Have you ever had a life-threatening illness?	○	○
Have you been robbed or been present during a robbery in which the robber(s) used or displayed a weapon?	○	○
Have you ever been hit or beaten up and badly hurt by a stranger or someone you didn´t know very well?	○	○
Have you seen a stranger (or someone you didn´t know very well) attack or beat up someone and seriously injure or kill him or her?	○	○

Next

	Yes	No
Has anyone threatened to kill you or cause you serious physical harm?	○	○
While growing up: Were you physically punished in a way that resulted in bruises, burns, cuts, or broken bones?	○	○
While growing up: Did you see or hear family violence? (such as your father hitting your mother, or any family member beating up or inflicting bruises, burns, or cuts on another family member)	○	○
Have you ever been slapped, punched, kicked, beaten up, or otherwise physically hurt by your spouse (or former spouse), a boyfriend or girlfriend, or some other intimate partner?	○	○
Before your 13th birthday: Did anyone who was at least 5 years older than you touch or fondle your body in a sexual way or make you touch or fondle his or her body in a sexual way?	○	○
Were you ever subjected to uninvited or unwanted sexual attention? (examples: touching, cornering, pressure for sexual favors, verbal remarks)	○	○
Has anyone stalked you (in other words, followed you or kept track of your activities), causing you to feel intimidated or concerned for your safety?	○	○
Have you experienced (or seen) any other events that were life threatening, caused serious injury, or were highly disturbing or distressing? (examples: lost in the wilderness; a serious animal bite; an abortion or a miscarriage; being kidnapped or held hostage; seeing a mutilated body or body parts) Please state	○	○

Next

	1 Not affected	2	3	4	5 Strongly affected
Do you think you are still affected by the described life-experience(s)	○	○	○	○	○

Next

Thank you for your collaboration in this study!

To participate in the raffle, please send an email with the subject „**raffle**" to the following address:
studentenprojekt@psycho.uni-tuebingen.de

If you have any questions about the study, please feel free to contact us at the same email address.

If after answering the survey you think you could need further advice or assistance, please check the following information:

For psychological advice:

Psychotherapeutische Beratungsstelle (PBS)
(Psychotherapeutische Beratungsstelle für Studierende des Studentenwerks Tübingen-Hohenheim)
All services are strictly confidential and free of charge
Gartenstr. 26, 72074 Tübingen
Tel. 07071/253960
Appointment by telephone Mo-Fr 8.45-12.15

For information about your studies:

Academic Advice Center (ABZ)
Akademisches Beratungszentrum
Wilhelmstr. 11, 72074 Tübingen
Tel. 07071-2977735

Or please contact your University

Close Window

Appendix B

Online survey T2

EBERHARD KARLS
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TÜBINGEN

Welcome and thank you for your interest!

This is the second part of the survey about the condition and well-being of students in Germany, in which you already participated one year ago. This time the survey is about changes in your life concerning your situation compared to last year.

Your response is extremely valuable to increase our knowledge about the situation of students in Germany and to design strategies to cope the difficulties that they face. Surely, in this survey there are some personal questions, but please be assured that your responses will be completely anonymous and confidential. The entire survey takes approximately 15-20 minutes to complete. As we appreciate your time, by completing the survey you will have the possibility of winning one of 3 prizes:

1. prize: **200 Euro**
2. prize: **120 Euro**
3. prize: **80 Euro**

After answering the questions you can send an e-mail to the address that appears at the end of the survey in order to participate in the raffle. Your email address is therefore not attached to your survey responses and they remain anonymous. Participation in the raffle takes place after a plausibility test of the survey data. Participation in this survey is voluntary.

Please carefully read the following instructions:

- This study is about your individual experiences. There are no right or wrong answers.

- Once you start answering the survey you should complete it until the end. It is not possible to save part of the data and continue later.

- When responding the survey, **DO NOT** use the "Back" button on your computer. Closing the browser or using the "Back" button to return to a previous screen will result in data loss.

- If you are ready to start, press NEXT

Next

Please give your Personal Code
(6-digit personal code for research purposes)

Your personal code consists of the first letter of your birthplace, the first letter of your first name, and the day and month of your birthday.

Example:

If you were born in **W**ashington, your name was **D**avid, and you were born on the **22**th of July(**07**): **WD2207**

Next

Sex

- male
- female

Age

Years

Nationality (country)

- Germany
- Other, please enter

From which state (Bundesland) are you from?
(if applicable)

Please choose

Marital Status

Please choose

Do you have children?

- Yes
- No

Next

Main financial source
Please select the most important source

Please choose

Monthly income

Euro

Do you currently work (part time job / full-time employment)?

- Yes
- No

How many hours per week on average do you work?
(If applicable)

hours per week

Do you currently study at the university (undergraduate / graduate / postgraduate)?

- Yes
- No, I do not study at the university anymore

Next

Why did you finish / quit university?
Please select the most important reason

Please choose

Other

At what university do you study?

- Eberhard-Karls-University Tübingen
- Other

Which degree are you pursuing at your current university?

Please choose

Field of study

Please choose

Other

In which semester are you now?

Please choose

At what university did you study?

- Eberhard-Karls-University Tübingen
- Other

Which degree were you pursuing?

Please choose

Field of study

Please choose

Other

In which term did you finish / quit university?

Please choose

Next

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UNIVERSITÄT
TÜBINGEN

Assessment of life events

In the next section there are a number of events which sometimes bring about change in the lives of those who experience them and which necessitate social readjustment.

Please check **only** those events which you have experienced **in the last 12 months**.

Also, for each item checked below, please indicate the extent to which you viewed the event as having either a positive or negative impact on your life at the time the event occurred. That is, indicate the type and extent of impact that the event had. A rating of -3 would indicate an extremely negative impact. A rating of 0 suggests no impact either positive or negative. A rating of +3 would indicate an extremely positive impact..

Next

Please check **only** those events which you have experienced **in the last 12 months**.

For each item checked below, please indicate the extent to which you viewed the event as having either a positive or negative impact on your life at the time the event occurred.

	extremely negative	moderately negative	somewhat negative	no impact	slightly positive	moderately positive	extremely positive
	-3	-2	-1	0	+1	+2	+3
Marriage	○	○	○	○	○	○	○
Detention in jail or comparable institution	○	○	○	○	○	○	○
Death of spouse	○	○	○	○	○	○	○
Major change in sleeping habits (much more or much less sleep)	○	○	○	○	○	○	○
Death of a family member: a. mother	○	○	○	○	○	○	○
b. father	○	○	○	○	○	○	○
c. brother	○	○	○	○	○	○	○
d. sister	○	○	○	○	○	○	○
e. grandmother	○	○	○	○	○	○	○
f. grandfather	○	○	○	○	○	○	○
g. other	○	○	○	○	○	○	○
Major change in eating habits (much more or much less food intake)	○	○	○	○	○	○	○

Next

Please check **only** those events which you have experienced **in the last 12 months**.

	extremely negative	moderately negative	somewhat negative	no impact	slightly positive	moderately positive	extremely positive
	-3	-2	-3	0	+1	+2	+3
Foreclosure on mortgage or loan	○	○	○	○	○	○	○
Death of a close friend	○	○	○	○	○	○	○
Outstanding personal achievement	○	○	○	○	○	○	○
Minor law violations (traffic tickets, disturbing the peace, etc.)	○	○	○	○	○	○	○
Wife's / girlfriend´s pregnancy	○	○	○	○	○	○	○
Pregnancy	○	○	○	○	○	○	○
Changed work situation (different work responsibility, major change in working conditions, working hours, etc.)	○	○	○	○	○	○	○
New job	○	○	○	○	○	○	○
Serious illness or injury of close family member:	○	○	○	○	○	○	○
a. father							
b. mother	○	○	○	○	○	○	○
c. sister	○	○	○	○	○	○	○
d. brother	○	○	○	○	○	○	○
e. grandfather	○	○	○	○	○	○	○
f. grandmother	○	○	○	○	○	○	○
g. spouse	○	○	○	○	○	○	○
h. other	○	○	○	○	○	○	○

Next

Please check **only** those events which you have experienced **in the last 12 months**.

	extremely negative	moderately negative	somewhat negative	no impact	slightly positive	moderately positive	extremely positive
	-3	-2	-1	0	+1	+2	+3
Sexual difficulties	○	○	○	○	○	○	○
Trouble with employer (in danger of losing job, being suspended, demoted, etc.)	○	○	○	○	○	○	○
Trouble with relatives	○	○	○	○	○	○	○
Major change in financial status (a lot better or a lot worse off)	○	○	○	○	○	○	○
Major change in closeness of family members (increased or decreased closeness)	○	○	○	○	○	○	○
Gainig a new family member (through birth, adoption, family member moving in, etc.)	○	○	○	○	○	○	○
Change of residence	○	○	○	○	○	○	○
Marital separation from mate (due to conflict)	○	○	○	○	○	○	○
Major change in church activities (increased or decreased attendance)	○	○	○	○	○	○	○
Marital reconcilation with mate	○	○	○	○	○	○	○

Next

Please check **only** those events which you have experienced **in the last 12 months**.

	extremely negative	moderately negative	somewhat negative	no impact	slightly positive	moderately positive	extremely positive
	-3	-2	-1	0	+1	+2	+3
Major change in the number of arguments with spouse (a lot more or a lot less arguments)	○	○	○	○	○	○	○
Change in spouse's work (beginning work, ceasing work, changing to a new job, retirement, etc.)	○	○	○	○	○	○	○
Major change in usual type and/or amount of recreation	○	○	○	○	○	○	○
Borrowing more than 10.000 euro (buying home, business, etc.)	○	○	○	○	○	○	○
Borrowing less than 10.000 euro (buying car, TV, getting school loan, etc.)	○	○	○	○	○	○	○
Being fired from job	○	○	○	○	○	○	○
Wife / girlfriend having abortion or miscarriage	○	○	○	○	○	○	○
Having abortion or miscarriage	○	○	○	○	○	○	○
Major personal illness or injury	○	○	○	○	○	○	○
Major change in social activities, e.g., parties, movies, visiting (increased or decreased participation)	○	○	○	○	○	○	○

Next

Please check **only** those events which you have experienced **in the last 12 months**.

	extremely negative	moderately negative	somewhat negative	no impact	slightly positive	moderately positive	extremely positive
	-3	-2	-1	0	+1	+2	+3
Major change in living conditions of family (building new home, remodeling, deterioration of home, neighborhood, etc.)	○	○	○	○	○	○	○
Divorce	○	○	○	○	○	○	○
Serious injury or illness of close friend	○	○	○	○	○	○	○
Son or daughter leaving home (due to marriage, college, etc.)	○	○	○	○	○	○	○
Ending of studies	○	○	○	○	○	○	○
Separation from spouse (due to work, travel, etc.)	○	○	○	○	○	○	○
Engagement	○	○	○	○	○	○	○
Breaking up with boyfriend / girlfriend	○	○	○	○	○	○	○
Leaving home for the first time	○	○	○	○	○	○	○
Reconciliation with boyfriend / girlfriend	○	○	○	○	○	○	○

Next

Please check **only** those events which you have experienced **in the last 12 months**.

	extremely negative	moderately negative	somewhat negative	no impact	slightly positive	moderately positive	extremely positive
	-3	-2	-1	0	+1	+2	+3
Beginnig a new school experience at a higher academic level (college, graduate school, professional school, etc.)	○	○	○	○	○	○	○
Changing to a new school at same academic level (undergraduate, graduate, etc.)	○	○	○	○	○	○	○
Being dismissed from dormitory or other residence	○	○	○	○	○	○	○
Failing an important exam	○	○	○	○	○	○	○
Changing a major	○	○	○	○	○	○	○
Failing a course	○	○	○	○	○	○	○
Dropping a course	○	○	○	○	○	○	○
Joining a fraternity / sorority	○	○	○	○	○	○	○
Financial problems concerning school (in danger of not having sufficient money to continue)	○	○	○	○	○	○	○
Other recent experiences which have had an impact on your life. List and rate:	○	○	○	○	○	○	○
	○	○	○	○	○	○	○
	○	○	○	○	○	○	○

Next

Dealing with stressful situations

How do you typically react to a difficult, stressful, or upsetting situation?
This is for me...

	very untypical	rather untypical	partly typical partly untypical	rather typical	very typical
	1	2	3	4	5
Try to be with other people	○	○	○	○	○
Blame myself for procrastinating	○	○	○	○	○
Blame myself for having gotten into this situation	○	○	○	○	○
Window shop	○	○	○	○	○
Outline my priorities	○	○	○	○	○
Treat myself to a favorite food or snack	○	○	○	○	○
Feel anxious about not being able to cope	○	○	○	○	○
Become very tense	○	○	○	○	○
Think about how I have solved similar problems	○	○	○	○	○
Go out for a snack or meal	○	○	○	○	○
Become very upset	○	○	○	○	○
Determine a course of action and follow it	○	○	○	○	○

Next

How do you typically react to a difficult, stressful, or upsetting situation?
That is for me...

	very untypical	rather untypical	partly typical partly untypical	rather typical	very typical
	1	2	3	4	5
Blame myself for not knowing what to do	○	○	○	○	○
Work to understand the situation	○	○	○	○	○
Think about the event and learn from my mistakes	○	○	○	○	○
Wish that I could change what had happened or how I felt	○	○	○	○	○
Visit a friend	○	○	○	○	○
Spend time with a special person	○	○	○	○	○
Analyze the problem before reacting	○	○	○	○	○
Phone a friend	○	○	○	○	○
Get angry	○	○	○	○	○
See a movie	○	○	○	○	○
Come up with several different solutions to the problem	○	○	○	○	○
Try to be organized so I can be on top of the situation	○	○	○	○	○

Next

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The next section is about **your health**. Please read the questions carefully and pay attention to the different time specifications.

Next

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During the last 4 weeks, how much have you been bothered by any of the following problems?

	Not bothered	Bothered a little	Bothered a lot
Stomach pain	○	○	○
Back pain	○	○	○
Pain in your arms, legs, or joints (knees, hips, etc)	○	○	○
Menstrual cramps or other problems with your periods	○	○	○
Pain or problems during sexual intercourse	○	○	○
Headaches	○	○	○
Chest pain	○	○	○
Dizziness	○	○	○
Fainting spells	○	○	○
Feeling your heart pound or race	○	○	○
Shortness of breath	○	○	○
Constipation, loose bowels, or diarrhea	○	○	○
Nausea, gas, or indigestion	○	○	○

Next

Over the last 2 weeks how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days	Nearly every day
Little interest or pleasure in doing things	○	○	○	○
Feeling down, depressed or hopeless	○	○	○	○
Trouble falling or staying asleep, or sleeping too much	○	○	○	○
Feeling tired or having little energy	○	○	○	○
Poor appetite or overeating	○	○	○	○
Feeling bad about yourself, or that you are a failure, or have let yourself or your family down	○	○	○	○
Trouble concentrating on things, such as reading the newspaper or watching television	○	○	○	○
Moving or speaking so slowly that other people could have noticed? Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual	○	○	○	○
Thoughts that you would be better off dead or of hurting yourself in some way	○	○	○	○

Next

In the last 4 weeks, have you had an anxiety attack (sudden feeling of fear or panic)?

- ○ Yes
- ○ No

Over the last 4 weeks, have you been feeling nervous, anxious, on edge, or worrying a lot about different things?

- ○ Not at all
- ○ Several days
- ○ More than half the days

Do you ever drink alcohol (including beer or wine)?

- ○ Yes
- ○ No

Next

In regard to the anxiety attack (sudden feeling of fear or panic), please answer the following questions

	Yes	No
Has this ever happened before the last 4 weeks?	○	○
Do some of these attacks come suddenly out of the blue - that is, in situations where you don't expect to be nervous or uncomfortable?	○	○
Do these attacks bother you a lot or are you worried about having another attack?	○	○
During your last bad anxiety attack, did you have syntoms like shortness of breath, sweating, your heart racing or pounding, dizziness or faintness, tingling or numbness, or nausea or upset stomach?	○	○

Next

Over the last 4 weeks, how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days
Feeling restless so that it is hard to sit still	○	○	○
Getting tired very easily	○	○	○
Muscle tension, aches, or soreness	○	○	○
Trouble falling asleep or staying asleep	○	○	○
Trouble concentrating on things, such as reading a book or watching TV	○	○	○
Becoming easily annoyed or irritable	○	○	○

Next

Have any of the following happened to you more than once in the last 6 months?

	Yes	No
You drank alcohol even though a doctor suggested that you stop drinking because of a problem with your health	○	○
You drank alcohol, were high from alcohol, or hung over while you were working, going to university, or taking care of children or other responsibilities	○	○
You missed or were late for work, university, or other activities because you were drinking or hung over	○	○
You had a problem getting along with other people while you were drinking	○	○
You drove a car after having several drinks or after drinking too much	○	○

Next

Have any of the following happened to you more than once in the last 6 months?

	Yes	No
You drank alcohol even though a doctor suggested that you stop drinking because of a problem with your health	○	○
You drank alcohol, were high from alcohol, or hung over while you were working, going to university, or taking care of children or other responsibilities	○	○
You missed or were late for work, university, or other activities because you were drinking or hung over	○	○
You had a problem getting along with other people while you were drinking	○	○
You drove a car after having several drinks or after drinking too much	○	○

Next

Thank you for your collaboration in this study!

To participate in the raffle, please send an email with the subject „**raffle**" to the following address:
studentenprojekt@psycho.uni-tuebingen.de

If you have any questions about the study, please feel free to contact us at the same email address.

If after answering the survey you think you could need further advice or assistance, please check the following information:

For psychological advice:

Psychotherapeutische Beratungsstelle (PBS)
(Psychotherapeutische Beratungsstelle für Studierende des Studentenwerks Tübingen-Hohenheim)
All services are strictly confidential and free of charge
Gartenstr. 26, 72074 Tübingen
Tel. 07071/253960
Appointment by telephone Mo-Fr 8.45-12.15

For information about your studies:

Academic Advice Center (ABZ)
Akademisches Beratungszentrum
Wilhelmstr. 11, 72074 Tübingen
Tel. 07071-2977735

Or please contact your University

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