How Are You Doing? A Survey of Mental Health, Stress, and Alcohol Use Among University Students in the Netherlands

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Abstract

Introduction: University students are particularly exposed to the experience of stress which raises concern for their wellbeing. Stress poses a serious risk to mental health and can also encourage alcohol consumption. Wellbeing has become a popular subject in society but has only begun to receive researchers' attention. This study screened students for their experience of stress, mental health complaints, wellbeing, and alcohol use. Further, it was aimed at discovering what impact stress has on mental health and alcohol use. Finally, little is known about the Dutch student population which this study aimed to give insight into.

Method: 1474 students from all study programs at the University of Twente (UT) completed a self-administered questionnaire assessing their mental health (depression, anxiety, wellbeing), perceived stress levels, and alcohol use. Depression was measured using the PHQ-9, anxiety using the GAD-7, and wellbeing using the MHC-SF. Stress was measured based on the PSS-14 and alcohol consumption based on the AUDIT-C. Using correlation and regression analyses, it was assessed how all variables are related and, specifically, how stress predicts mental health and alcohol use. It was further measured whether stress and alcohol use add predictive power to the prediction of wellbeing from depression and anxiety.

Results: It was found that students experience moderate levels of stress. 36.7% of the sample experienced minimal depressive symptoms, 21.5% appeared to have a minor or mild major depression, and 17.0% a moderately severe or severe major depression. 31.0% of the sample experienced minimal anxiety levels, 33.3% mild levels, 21.7% moderate levels, and 13.8% severe levels. 72.4% of females and 73.2% of males classified as optimal for identifying hazardous drinking or active alcohol use disorder. Moderately strong levels of wellbeing were found. Stress predicted negative mental health, but not wellbeing. Alcohol use was not related to stress or mental health.

Conclusion: Stress, depression, and anxiety are persisting problems in the student population. Stress seems to predict mental health complaints, while its relationship with wellbeing remains unclear. Promisingly, students also seem to experience moderately high levels of wellbeing which may be utilized to combat stress and negative mental health. The current findings hope to contribute to the university's aim to improve student support services and promote wellbeing through future policy decisions.

Keywords: mental health, positive mental health, negative mental health, perceived stress, alcohol use, depression, anxiety, wellbeing, university students, alcohol consumption, stress, alcohol abuse

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Stress in Students

University students experience certain stressors related to their unique situation, such as a heavy workload (Vaez, De Leon, & Laflamme, 2006), peer competition, fears about the future (Tavolacci et al., 2013), little control over their personal situation (Veaz et al., 2006), and the continuous pressure to succeed (Vaez et al., 2006; Klemenc-Ketis, Kersnik, Eder, & Colaric, 2011; Tavolacci et al., 2013). Schoolwork has been identified as one of the main daily stressors faced by adolescents which in turn has been associated with poor academic functioning (Low et al., 2012; Klemenc-Ketis et al., 2011). In addition, Steptoe, Wardle, Pollard, Canaan, and Davies (1996) found that students experience significantly higher levels of stress during exam periods compared to students that are not taking exams. International students often face additional challenges such as adjusting to a new culture (Rosenthal, Russell, & Thomson, 2008) and may, therefore, experience additional stress.

Stress as a Mental Health Risk

Stress, which is a psychosocial factor, is believed to impact health in two general ways. First, it can foster certain psychophysiological responses, such as autonomic, neuroendocrine, and immune responses. These responses make a person vulnerable to pathogens and can even stimulate disease mechanisms, and are, therefore, connected to psychopathologies. Second, stress can impact health-associated behaviors such as substance use, including alcohol and cigarettes, physical activity, and diet, which can threaten individuals' health and wellbeing (Steptoe et al., 1996). Today, university students experience more stress and pressure than ever before. While pressure can help lead to improved academic and other performance, too much pressure can cause stress and, in turn, pose several serious health risks (Tavolacci et al., 2013). It has been found that university students suffer from a variety of mental health issues that may be related to stress (Low et al., 2012). Depressive symptoms have been found to be especially prevalent among university students (Klemenc-Ketis et al., 2011) and depression and anxiety have been found to be associated with personal stress caused by schoolwork (Low et al., 2012). Next to impacting students' mental health, stress also impacts their general quality of life (Mikolajczyk et al., 2008; Klemenc-Ketis et al., 2011). Especially first-year students rate their quality of life as lower than working peers do and rate their general health as average or low (Vaez et al., 2006). They also report lower levels of satisfaction than other occupations (Cotton, Dollard, & de Jonge, 2002). These findings may be attributed to transitional issues, including

social aspects of starting one's studies and the many academic demands faced (Vaez et al., 2006). Another concern is that daily stressors and stressful life events cannot only impact adolescents' mental health but also that the experience of mental health symptoms can lead to stress (Low et al., 2012). Depressive symptoms, for example, help lead to an increased experience of stress in daily life in that pessimism and negative meaning-making of events lead to the interpretation of events as more stressful (Hammen, 2015). International students face an especially large risk of developing psychological problems (Sandhu & Asrabadi, 1994; Ward & Rana-Deuba, 1999), likely due to additional challenges (Rosenthal et al., 2008).

Stress on Alcohol Use

Stress is associated with substance use (Park, Armeli, & Tennen, 2004), alcohol being one of the three most common substances used by adolescents next to tobacco and cannabis (Tavolacci et al., 2013). The use of alcohol is known to be frequent among university students although consumption tends to vary considerably among individuals and colleges (Wechsler, Molnar, Davenport, & Baer, 1999). An analysis of the data from the Harvard School of Public Health College Alcohol Study (1993) done by Wechsler et al. (1999) revealed that frequent binge drinkers (19.0%) consume an average of 14.5 drinks per week, infrequent binge drinkers (24.0%) 3.7 drinks, and non-binge drinkers and non-drinkers (approximately half of the sample) close to zero drinks.

Tavolacci et al. (2013) found that the number of students with alcohol use disorders increased with the increase of stress. Steptoe et al. (2009) also found a relationship between stress and alcohol consumption, but they found that students with little social support increased their consumption of alcohol during exam periods by 18.5% while students with high social support decreased their alcohol use. This may be explained by the fact that there is a social influence on the association of alcohol use and stress being that socially embedded individuals drink less during stressful exam periods because they reduce their social drinking and socially isolated persons drink more and alone (Steptoe et al., 1996). Increased alcohol use is also related to the transition period and various associated stressors that university students experience (Vaez et al., 2006). Baer (2002) reports stress and negative affect relief drinking patterns among college students. To better understand these links, further research into the relationship between stress and alcohol use is necessary.

Alcohol Abuse on Mental Health

Stress has been suggested to be related to alcohol use which can also influence mental health. Stress- and anxiety-based drinking has been found to lead to increases in drinking levels,

negative consequences, and long-term and severely negative consequences (Baer, 2002). Drinking as a coping behavior is especially dangerous because emotions and problems are not adequately dealt with and abusive alcohol patterns are more likely to develop (Cooper, Russell, & George, 1988). This might be especially relevant for students during this transition period. Alcohol is effective in reducing negative affective states stemming from stress, which positively reinforces consumption and, therefore, makes repeated consumption likely when stress is experienced (Park et al., 2004).

Alcohol abuse poses a serious mental health risk, especially in adolescents, and causes concern about wellbeing later in life (Tavolacci et al., 2013). University students' drinking behavior is, therefore, an important concern to public health (Wechsler et al., 1999). Alcohol use is linked to academic problems, depression, and other mental disorders (Tavolacci et al., 2013). In the Harvard study analysis by Wechsler et al. (1999), 70.7% of the respondents who drank in the last year reported suffering from at least one problem as a result of drinking. Study-related problems included missing class and falling behind and other problems included arguing with friends, doing something they later regretted, engaging in unprotected sex, having trouble with the police, and getting injured (Wechsler et al., 1999).

Wellbeing

In addition to looking at several different consequences of stress, it is also interesting to look at what effect stress might have on wellbeing. Will the effects be similarly negative to the ones assumed on depression and anxiety? There is a tendency in research to focus primarily on the negative side of mental health (i.e. depression and anxiety) and less on the positive side (i.e. wellbeing). As noted by Seligman and Csikszentmihalyi (2000), mental health is not simply the absence of psychological illness but should answer the claim of mental *well*being and thrive. So, while focusing on complaints is important when thinking of mental health, wellbeing is just as important. One way to identify mental wellbeing is that it comprises six factors being self-acceptance, personal growth, purpose in life, positive relations with others, environmental mastery, and autonomy (Ryff, 1989). Wellbeing could be a way to protect oneself from the experience of mental health complaints. Wellbeing in students might, therefore, be an important asset to counter study-related stressors and maintain good mental health while studying at university. Little is known about the level of wellbeing in students in the Netherlands and the relationship of wellbeing with stress.

Research Questions and Assumptions

The serious consequences of stress and alcohol misuse exemplify the importance of recognizing students' struggles to be able to support them and prevent problems from occurring in the future. It is furthermore of interest to explore the correlations of mental health, perceived stress, and alcohol use to further examine how these variables are related. It is noteworthy that this study did not assess causal relationships, but merely explored correlations and regressions between variables. It is also necessary to look at what role wellbeing plays in this context and how it is impacted by stress in comparison to depression and anxiety. It is interesting to investigate whether negative mental health impacts wellbeing. This may allow the connection of negative and positive mental health and make more informed judgments about the link between stress and mental health. The previous problem analysis amounted to the following research questions and associated assumptions.

1. What are the levels of stress, alcohol use, and mental health (wellbeing, depression, anxiety) in students?
2. How are wellbeing, anxiety, depression, alcohol use, and perceived stress correlated?
3. Can we predict mental health (wellbeing, depression, anxiety) and alcohol use from perceived stress?
4. Do perceived stress and alcohol use add predictive power to the prediction of wellbeing from depression and anxiety?

1. This research aims at exploring how high the stress levels of students in the Netherlands are. It is expected that students consume moderate levels of alcohol, comparable to the findings from other studies conducted at universities. Based on the available literature, it is expected that UT students experience mental health complaints at a moderately high level. This study aims to explore what levels of wellbeing UT students experience.

2. Anxiety and depression are expected to be strongly correlated because they are similar in symptoms and expression (Lovibond & Lovibond, 1995). Anxiety and depression are assumed to diminish wellbeing (Lamers, Westerhof, Glas, & Bohlmeijer, 2015) and, therefore, correlate moderately strongly with wellbeing.

Based on the literature, perceived stress is expected to correlate moderately strongly with both depression and anxiety. The research on the relationship between perceived stress and wellbeing is limited but there are many links with quality of life (Vaez et al., 2006; Mikolajczyk et al., 2008; Klemenc-Ketis et al., 2011) which may suggest that as the quality of life diminishes, so does wellbeing. Therefore, a moderate correlation is expected. There is a case for the relation of stress with alcohol use in the literature, however, little is known about

the alcohol use of this population which also includes different cultures. A positive but weak correlation is assumed.

There is limited research on perceived stress and wellbeing, but the alcohol consuming students are assumed to have a positive association with alcohol and underestimate its negative effects on wellbeing. A very weak correlation is, therefore, expected. Based on the literature, the correlations between alcohol use and both depression and anxiety are expected to be moderately strong.

3. Perceived stress is believed to predict depression and anxiety moderately strongly, as suggested in the literature. Wellbeing may be negatively affected by perceived stress since there is a link with the quality of life and negative mental health. However, because there is not much insight yet, the predictive power of perceived stress on wellbeing is expected to be weak. Based on the literature, it is assumed that perceived stress weakly predicts alcohol use.

4. The study aims at exploring whether perceived stress and alcohol use will add any predictive power to the prediction of wellbeing from depression and anxiety.

Method

Participants

A cross-sectional study that attempted to encapsulate the perceived stress, mental health (depression, anxiety, wellbeing), and alcohol use levels of the student population of a research university in the east of the Overijssel province of the Netherlands was used. The population was all ~10,000 students from all study programs registered full-time at the university. The sample consisted of 2,057 students (response rate of ~20%). Participants ages ranged from 18 to 77 years (M = 22.19). Participants had no incentive for participating in the study other than helping the university learn about the students' mental health. Of the entire sample, 1474 students were included. 10 students were excluded because the lower cut-off value for the time needed to complete the survey was set at 10 minutes since the survey was estimated to take 25 minutes to complete. One participant who stated to be 99 years old was excluded because there is no registered student with that age. The lower cut-off value for the progress achieved on the questionnaire was set at 55% because, although not filled out entirely, such participants filled in at least one questionnaire which led to viable data collection for that variable. This way, as little usable data as possible, was aimed to be lost. It is relevant to note that, therefore, the sample sizes for the different scales differ slightly.

Measures

To measure the various research variables and answer the research questions, a questionnaire was developed. The final version of the questionnaire consisted of 40 items. The questionnaire was composed of pre-existing questionnaires, as well as self-employed items of the researchers. The psychometric properties of the validated questionnaires used constituted themselves as overall high. The appropriateness of the self-employed items was assessed by means of a pilot test. Generally, when selecting psychological scales and tests to be included in the survey, it was a priority to select brief, yet validated measures to minimize the burden on participants while not compromising the validity and reliability of the measure. In the survey, the to be measured variables were employed as blocks and the questions within each block were randomized.

The survey was created in cooperation with other researchers from a broader research project that this study was a part of. Therefore, only a part of the data collected through this survey was used for this research. To assess the relevant research variables perceived stress, mental health (wellbeing, depression, anxiety), and alcohol use, five pre-existing questionnaires were included in the survey.

Demographics. Characteristic variables of the participants (age, gender, nationality, study year, study program) were assessed.

Perceived stress measure. The perceived stress levels of respondents were measured using the 14-item Perceived Stress Scale (PSS-14) developed by Cohen, Kamarck, and Mermelstein (1983). The PSS-14 was chosen because it is a classic yet prominently used psychological instrument with good internal consistency (α = .84 and .85) in two college samples (Cohen et al., 1983). It measures stress as perceived during the last month. Responses were recorded on a five-point Likert scale (0 = never to 4 = very often). Of the fourteen items, seven are phrased negatively (1, 2, 3, 8, 11, 12, 14) and embody helplessness and the remaining seven positively (4, 5, 6, 7, 9, 10, 13) and represent self-efficacy. An example of a negative item is “In the last month, how often have you found that you could not cope with all the things that you had to do?” and an example of a positive item is “In the last month, how often have you felt that you were on top of things?”. Positively phrased items had to be reverse scored before a sum score (0 to 56) was calculated. Continuous scoring was used by calculating respondents’ mean scores on each question and summing them up. There exist no norm tables for this scale as it is a screening tool. The internal consistency computed in this study was good (α = .86).

Wellbeing measure. To assess mental wellbeing, the Mental Health Continuum-Short Form (MHC-SF), developed by Keyes (2009), was used. It was chosen because of its ideal length, good psychometric properties, ability to capture change, and stability over time (Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011). The 14-item MHC-SF is derived from the original 40-item long form (MHC-LF). The short form has very good reliability ($\alpha = .89$) and its factor structure has been validated across several countries, including the Netherlands (Lamers et al., 2011). The form assesses emotional, social, and psychological wellbeing as well as hedonic and eudaimonic wellbeing. In the MHC-SF, emotional wellbeing is assessed by means of three items (happiness, interest in life, and satisfaction), social wellbeing through five items, and psychological wellbeing by means of six items. An example of an item measuring social wellbeing is "During the past month, how often did you feel that people are basically good?". An example of psychological wellbeing is "During the past month, how often did you feel that you had experiences that challenged you to grow and become a better person?". The responses to the questions were recorded by means of a six-point Likert scale (0 = never to 5 = every day). Continuous scoring was used. Participants' mean scores on each question were calculated and summed up by subscales and in total (0 to 70) (see Table 2). Participants' total scores may be compared to the ones obtained in a study with the general Dutch population (N = 1,662, M = 41.72, SD = 11.9) (Lamers et al., 2011). In this study, the scale had excellent internal consistency ($\alpha = .92$).

Depression measure. In addition, depression was assessed using the Brief Patient Health Questionnaire Mood Scale (PHQ-9). The PHQ-9 makes a diagnosis based on the nine DSM-VI diagnostic criteria for depression. The scale is a reliable measure of depressive disorders and depression severity (Kroenke, Spitzer, & Williams, 2001) and its briefness was ideal for this study. Its reliability has been validated, e.g. in a study with patients in primary care ($\alpha = .84$) (Cameron, Crawford, Lawton, & Reid, 2008). The scale measures the severity of various depressive symptoms by means of a four-point Likert scale (0 = not at all to 3 = nearly every day). The participant is asked to rate these symptoms based on the last two weeks. An example of an item is "Over the past 2 weeks, how often have you been bothered by any of the following problems? Feeling down, depressed or hopeless". Participants' severity scores (total scores) were computed by adding the scores on the different questions (0 to 27). There are four possible provisional diagnoses; 'minimal symptoms' (5 to 9), 'minor depression to mild major depression' (10 to 14), 'moderately severe major depression' (15 to 19), and 'severe major depression' (> 20) (Pfizer Inc., 1999). The scale had good internal consistency ($\alpha = .84$).

Anxiety measure. Anxiety was measured using the Generalized Anxiety Disorder Scale (GAD-7) developed by Spitzer, Kroenke, Williams, and Löwe (2006). General anxiety disorder is one of the most common anxiety disorders which makes this scale a good option for testing the prevalence of anxiety symptoms. In addition, there are few brief validated measures for anxiety, especially self-administered tests (Spitzer et al., 2006). The GAD-7 has excellent reliability (α = .92), is concise, and easily understandable (Donker, van Straten, Marks, & Cuijpers, 2011). The scale items ask about participants' encounter with different problems (e.g. worrying, irritability) during the last two weeks. An example item is "Over the past 2 weeks, how often have you been bothered by the following problems? Feeling nervous, anxious or on edge". The responses to the items are recorded by means of a 4-point Likert scale (0 = not at all to 3 = nearly every day). Participants' total scores are determined by calculating a sum score of all responses (0 to 21). The GAD identifies several levels of anxiety severity: minimal (0 to 4), mild (5 to 9), moderate (10 to 14), and severe (15 to 21) (Spitzer et al., 2006). The internal consistency of the scale was good (α = .89).

Alcohol use measure. Alcohol use was measured using the Alcohol Use Disorder Identification Test-Consumption (AUDIT-C). This short 3-item test is an abbreviated version of the widely used 10-item screening instrument AUDIT, developed by the World Health Organization (WHO) (Seth et al., 2015). Though short, the AUDIT-C is a valid, practical and reliable (α = .88) screening test for heavy drinking, alcohol misuse, and alcohol dependence (Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998). Participants' responses are recorded using a five-point Likert scale with different responses for each question. The first question asks the participant about how often she has an alcoholic drink (0 = never to 4 = 4 or more times a week) and the second question about how many standard alcoholic drinks she has on a typical day (0 = 1 or 2 to 4 = 10 or more). The third question asks about how often she has six or more drinks on one occasion (0 = never to 4 = daily or almost daily). Participants' scores are calculated using sum scores (0 to 12). The rating differs for women and men. Women need a score of three or more for the test to be considered positive and to identify dangerous drinking or active alcohol use disorder; men need a score of four or more (Frank et al., 2008). The internal consistency of the measure found in this study was good (α = .83).

Procedure

The study was approved by the Ethical Committee of the UT where the research was conducted. Participants were recruited through the distribution of a mass recruitment e-mail containing the hyperlink to the survey created through the research and experience software

Qualtrics. With the link, a short description and aim of the research and the estimated duration of completing the questionnaire were provided. The recruitment e-mail was sent by the university to all its students. Once participants followed the hyperlink in Qualtrics, they were, again, provided with similar information to the ones in the e-mail. The contact details of one of the researchers were provided for questions. An informed consent form was provided assuring that participants' involvement was on a voluntary basis, subject to the conditions of the research, and could be withdrawn at any time. Participants were also informed about the anonymization and the confidential treatment of their personal data. They were asked to agree with their participation and the informed consent form. Once agreed, the survey started. Once completed they were thanked for their participation and, once again, provided with the previous contact details.

Data Analysis

The raw data to be examined were obtained from Qualtrics. Invalid responses were identified by checking, as far as possible, if they represented the student population. One participant was excluded because he indicated being 99 years old while there is no registered student with that age at the UT. To control for sincere participation in the study as best as possible, the time to fill out the questionnaire was set at a minimum of 10 minutes since the average expected time to complete the survey was set at 25 minutes. 10 participants were affected following this criterion. It was not assumed that there were further issues with sincerity since there was no other incentive to fill out the questionnaire. Furthermore, participants that completed less than 55.0% of the survey were not included on the basis that they failed to complete a single scale. Some of them answered the demographic questions but since they did not complete any one scale, their contribution to the research was determined as missing entirely. Altogether, 28.3% of the raw data was affected and the concerned participants removed. 1217 participants completed the entire survey. The final data set was comprised of 1474 participants. The criteria for excluding data were created in agreement with the other researchers working with the survey to optimize results.

Descriptives. Using SPSS, descriptive statistics were calculated for the demographic variables and the various scales. Frequencies of the variables gender, age, nationality, current study year, and psychological help were calculated. The means, standard deviations, minimums, maximums, and Cronbach's Alpha were calculated for each of the research variables perceived stress, mental health (wellbeing, depression, anxiety), and alcohol use to explore students' experiences with them (RQ1).

Correlation analyses. The bivariate correlations of the various test scores were computed using the Pearson Correlation Coefficient in SPSS to assess how the different research variables are related to each other (RQ2).

Regression analyses. Linear regression analyses were conducted to measure the prediction of the dependent variables wellbeing, depression, anxiety, and alcohol use from the independent variable perceived stress (RQ3). A stepwise regression analysis was conducted to explore whether perceived stress and alcohol use add predictive power to the prediction of wellbeing from depression and anxiety (RQ4). The first measurement in this analysis was the prediction of the dependent variable wellbeing from the independent variables depression and anxiety. Then, the independent variable perceived stress was added to this prediction as another predictor of wellbeing. Finally, the independent variable alcohol use was added to that prediction as another predictor.

Results

Descriptives

Demographics. Table 1 shows the characteristics of the participants. The sample was nearly equally comprised of females and males. The participants' mean age was 22.19 (*SD* = 3.37, range 18-77, *M* = 22). Most participants were Dutch, some German, and some of another nationality. Most participants were master students; the rest of the sample was almost equally distributed between year one, year two, and year three of a bachelor's program. Most participants had not previously received any psychological help.

Prevalence of mental health, stress, and alcohol use. Means, standard deviations, minimums, and maximums were calculated for all research variables (see Table 2). Of the 1474 participants who were included in the final data set, 92.8% filled out the PSS-14, 93.7% the MHC-SF, 93.9% the PHQ-9, 94.2% the GAD-7, and 87.5% the AUDIT-C. A quarter of the sample (*n* = 335, 24.7%) did not show depressive symptoms, around a third of the sample (*n* = 497, 36.7%) fit the category 'minimal symptoms' (5 to 9), a fifth of the sample (*n* = 292, 21.5%) fit the category 'minor depression to mild major depression', 171 participants (12.6%) fit the category 'moderately severe major depression', and 60 participants (4.4%) fit the category 'severe major depression'. Roughly one-third of the sample (*n* = 434, 31.2%) experienced minimal levels of anxiety (0 to 4), one-third of the sample (*n* = 462, 33.3%) mild anxiety levels (5 to 9), a fifth of the sample (*n* = 301, 21.7%) moderate anxiety levels (10 to 14), and 192

Table 1

Characteristics of the Participants

Characteristic	*N/n*	%
All valid participants	1474	100.0
Gender		
Female	672	45.6
Male	791	53.7
Other	11	0.7
Nationality		
Dutch	1058	71.8
German	158	10.7
Other	258	17.5
Current study year		
Year 1	314	21.3
Year 2	265	18.0
Year 3	292	19.8
Pre-master	28	1.9
Master	575	39.0
Received psychological help		
Yes	376	25.5
No	1098	74.5

participants (13.8%) severe levels of anxiety (15 to 21).

Females' mean score on the AUDIT-C was 3.53 (*SD* = 2.55, range 0-12), males' 4.72 (*SD* = 2.87, range 0-12), and others' 4.10 (*SD* = 3.14, range 0-9). 72.4% (*n* = 368) of females and 73.2% (*n* = 451) of males classified as positive and ideal for identifying dangerous drinking or active alcohol use disorder.

Correlation Analysis

Correlations among all research variables. Pearson correlation analyses were conducted between all variables (see Table 3). **1.** Overall, there was a weak, negative relationship between wellbeing and perceived stress. Increases in wellbeing were correlated with decreases in perceived stress. **2.** Overall, there was a moderately strong, positive relationship between depression and perceived stress. Increases in depression were correlated with increases in perceived stress. **3.** Overall, there was a moderately strong, positive relationship between anxiety and perceived stress. Increases in anxiety were correlated with increases in perceived stress. **4.** Overall, there was a very weak, negative relationship between alcohol use and perceived stress. Changes in alcohol use were not correlated with changes in perceived stress. **5.** Overall, there was a moderately strong, negative relationship between

Table 2

Summary of Means, Standard Deviations, Minimums, and Maximums for Scores on the MHC-SF, PHQ-9, GAD-7, PSS-14, and AUDIT-C

Measure	*n*	*M*	*SD*	*Min.*	*Max.*
MHC-SF	1381	40.86	13.90	0	70
PHQ-9	1384	8.71	5.56	0	27
GAD-7	1389	7.90	5.40	0	21
PSS-14	1368	29.36	3.85	16	42
AUDIT-C	1289	4.17	2.79	0	12

Note. MHC-SF = Mental Health Continuum-Short Form; PHQ-9 = Brief Patient Health Questionnaire Mood Scale; GAD-7 = Generalized Anxiety Disorder Scale; PSS-14 = Perceived Stress Scale-14; AUDIT-C = Alcohol Use Disorder Identification Test-Consumption.

depression and wellbeing. Increases in depression were correlated with decreases in wellbeing. **6.** Overall, there was a moderately strong, negative relationship between anxiety and wellbeing. Increases in anxiety were correlated with decreases in wellbeing. **7.** Overall, there was a very weak, positive relationship between alcohol use and wellbeing. Changes in alcohol use were not correlated with changes in wellbeing. **8.** Overall, there was a strong, positive relationship between anxiety and depression. Increases in anxiety were correlated with increases in depression. **9.** Overall, there was a very weak, negative relationship between alcohol use and depression. Changes in alcohol use were not correlated with changes in depression. **10.** Overall, there was a very weak, negative relationship between alcohol use and anxiety. Changes in alcohol use were not correlated with changes in anxiety.

Regression Analyses

Perceived stress as a predictor. Regression analyses were conducted to assess the prediction of wellbeing, depression, anxiety, and alcohol use from stress (see Table 4). Significant regression equations were found for all regressions. **1.** 8% of the variance in wellbeing was explained by perceived stress, $R^2 = .08$. **2.** 18% of the variance in depression was explained by perceived stress, $R^2 = .18$. **3.** 28% of the variance in anxiety was explained by perceived stress, $R^2 = .28$. **4.** 1% of the variance in alcohol use was explained by perceived stress, $R^2 = .01$.

Table 3

Summary of Pearson Correlations Among Scores on the PSS-14, MHC-SF, PHQ-9, GAD-7, and AUDIT-C

Measure	*1*	*2*	*3*	*4*	*5*
1. PSS-14	-				
2. MHC-SF	-.28**	-			
3. PHQ-9	.42**	-.58**	-		
4. GAD-7	.53**	-.53**	.74**	-	
5. AUDIT-C	-.10**	.16**	-.10**	-.13**	-

Note. For all scales, higher scores are indicative of stronger correlations with the other scales. MHC-SF = Mental Health Continuum-Short Form; PHQ-9 = Brief Patient Health Questionnaire Mood Scale; GAD-7 = Generalized Anxiety Disorder Scale; PSS-14 = Perceived Stress Scale-14; AUDIT-C = Alcohol Use Disorder Identification Test-Consumption.

** $p < .01$.

Table 4

Regression Analyses of Perceived Stress as a Predictor of Wellbeing, Depression, Anxiety, and Alcohol Use

Model	Variable	*B*	95% CI	β	*t*	*p*
1	(Wellbeing)	69.86	[64.37, 75.36]		24.94	.000
	Perceived Stress	-0.99	[-1.17, -0.80]	-.28	-10.45	.000
2	(Depression)	-8.91	[-10.98, -6.85]		-8.47	.000
	Perceived Stress	0.60	[0.53, 0.67]	.42	16.92	.000
3	(Anxiety)	-13.70	[-15.56, -11.83]		-14.40	.000
	Perceived Stress	0.74	[0.67, 0.80]	.53	22.92	.000
4	(Alcohol Use)	6.15	[5.00, 7.30]		10.47	.000
	Perceived Stress	-0.07	[-0.11, -0.03]	-.10	-3.41	.001

Note. CI = confidence interval.

Added predictive power from perceived stress and alcohol use. A stepwise regression analysis was conducted using SPSS with the dependent variable wellbeing and the independent variables depression, anxiety, perceived stress, and alcohol use (see Table 5). 37% of the variance in wellbeing was explained by depression and anxiety, $R^2 = .365$ (Model 1). When perceived stress was added to the regression calculation, it did not add predictive power to the prediction of wellbeing from depression and anxiety, $R^2 = .365$ (Model 2). When alcohol use was added, it added predictive power with a magnitude of .009 in R^2 to the prediction of wellbeing from depression and anxiety, $R^2 = .374$ (Model 3).

Table 5

Stepwise Regression Analysis of Depression, Anxiety, Perceived Stress, and Alcohol Use as Predictors of Wellbeing

Model	Variable	*B*	β	*t*	*p*
1	(Constant)	54.63		91.87	.000
	Depression	-1.07	-.43	-12.96	.000
	Anxiety	-0.56	-.22	-6.60	.000
2	(Constant)	52.09		20.57	.000
	Depression	-1.07	-.43	-13.00	.000
	Anxiety	-0.59	-.23	-6.53	.000
	Perceived Stress	0.10	.03	1.03	.303
3	(Constant)	49.47		19.14	.000
	Depression	-1.07	-.43	-13.10	.000
	Anxiety	-0.57	-.22	-6.24	.000
	Perceived Stress	0.11	.03	1.17	.241
	Alcohol Use	0.49	.10	4.39	.000

Note. Dependent variable: wellbeing.

Discussion

The perceived stress levels, mental health status, and alcohol use levels of students at the UT in the Netherlands were assessed, as well as their correlations. In addition to depression and anxiety as predictors of mental health, wellbeing was also of interest. It was assessed if mental health and alcohol use could be predicted from perceived stress. It was further assessed whether perceived stress and alcohol use would add predictive value to the prediction of wellbeing from depression and anxiety.

Prevalence of Mental Health, Perceived Stress, and Alcohol Use

The result of the current study suggests moderately high levels of wellbeing in students, comparable to those found in the general population (Lamers et al., 2011). A possible explanation for this finding is that wellbeing is not as affected by stress as assumed based on the negative effect of study-related stressors on mental health complaints (Vaez et al., 2006; Klemenc-Ketis et al., 2011; Tavolacci et al., 2013). Low et al. (2012) and Tavolacci et al. (2013) focused only on the relation between negative mental health and stress while missing the effect on positive mental health (i.e. wellbeing). The current finding is also in contrast to the report of a lower quality of life (Vaez et al., 2006), and lower satisfaction with life (Cotton et al., 2002) in students. However, there is other research on the quality of life and health in different student

populations which supports the current findings (El Ansari et al., 2011). Since these findings include variables on physical health, it is still necessary to look at psychological wellbeing in students alone. Evidently, the relationship between stress and wellbeing is not yet clear and requires further research.

Minimal symptoms of depression were experienced by most students, a quarter of the students did not experience symptoms, a fifth could be provisionally classified as having a minor to mild major depression, and 17.0% fit the diagnosis of a moderately severe or severe major depression. The results of the current study show that students show remarkably higher depression levels than the general population (Arroll et al., 2010; Kocalevent, Hinz, & Brähler, 2013). The findings also suggest that roughly one-third of students had minimal anxiety levels, one-third mild anxiety levels, and one-third moderately severe or severe anxiety levels. This result shows that students experience grossly higher anxiety levels than the general population (Johansson, Carlbring, Heedman, Paxling, & Andersson, 2013). The current results show that students experience markedly higher mental health complaints than the general population which is an important finding showing that students are an especially distressed population.

The result of the current study suggests that students experience considerable levels of stress, as also found in other student populations (Pierceall & Keim, 2007) and as indicated in the literature (Vaez et al., 2006; Klemenc-Ketis et al., 2011; Tavolacci et al., 2013). 28.2% of the participants were international students who have been suggested to be vulnerable to additional stress due to extra challenges (Rosenthal et al., 2008) which may have raised the mean stress level. This result calls on the university to take action in this matter to relieve students from stress where possible and offer them support in combating stress.

The findings suggest that 72.4% of females and 73.2% of males classified as positive and ideal for identifying dangerous drinking or active alcohol use disorder. The result of the current study suggests that most students show hazardous drinking behavior which is comparable to that found in other student populations (Connor, Gray, & Kypri, 2010) and higher than that found in the general population (Rubinsky, Dawson, Williams, Kivlahan, & Bradley, 2013).

Relations Between Mental Health, Perceived Stress, and Alcohol Use

The expected relationships between perceived stress and wellbeing and between stress, depression, and anxiety were confirmed. The expected relationship between anxiety and depression was confirmed. The expected relationship between depression, anxiety, and wellbeing was confirmed. This result adds to the existing cross-sectional studies with one

measurement occasion into the correlation of negative and positive mental health (e.g. Westerhof & Keyes, 2008) and provides insight into the Dutch student population. The expected relationship between wellbeing and alcohol use was confirmed. Alcohol may not always be viewed as something negative by students, especially because of the short-term positive effects of negative affect relief drinking (Baer, 2002; Park et al., 2004). The finding supports the assumption that wellbeing may be affected later in life, as suggested by Tavolacci et al. (2013), rather than immediately, which is a long-term effect this study was unfit to capture.

Surprisingly, changes in perceived stress were not correlated with changes in alcohol use as indicated by Tavolacci et al. (2013), especially in students with low social support (Steptoe et al., 1996). The current result gives a certain degree of comfort as it does not suggest concerning levels of stress- and negative affect relief drinking among students, as found by Baer (2002). It might be that there is a variable influencing this relationship which was not measured in this study, such as resilience or wellbeing. In this study, changes in stress were only slightly related to changes in wellbeing and wellbeing levels were moderately high which could suggest that wellbeing is a robust defense mechanism against the use of alcohol from stress. This relationship needs further exploration to be better understood and support students accordingly. In addition, in contrast to the assumption that there are moderately strong relationships between alcohol use and depression and alcohol use and anxiety, changes in depression and anxiety were not correlated with changes in alcohol use as indicated by Baer (2002). Previous research has shown that alcohol use is a common coping behavior (Cooper et al., 1988). Negative affect relief drinking (Baer, 2002; Park et al., 2004) and anxiety-based drinking (Baer, 2002) point to a relationship between mental health complaints and alcohol use. A possible explanation for why this link was not recovered in the present study is that students may already tend to consume alcohol at heightened levels due to a certain student lifestyle including the social and environmental exposure to alcohol. Therefore, alcohol use may be more habitual than negative affect-relieving or depression- or anxiety-based. More research on this topic is necessary.

Perceived Stress as a Predictor

In contrast to the expectation that perceived stress could predict depression and anxiety moderately strongly, only a very weak predictive power was found. In the literature, Low et al. (2012) suggest a link with mental health issues, depression, and anxiety, Steptoe et al. (1996) a link with psychopathologies in general, and Tavolacci et al. (2013) identified it as a serious health risk. Depressive symptoms were also found to be especially prevalent among students

(Klemenc-Ketis et al., 2011). A possible explanation for the current finding is that social support may have protected students from the negative effects of stress as indicated by El Ansari, Vodder Clausen, Mabhala, and Stock (2010). It is likely that talking about their problems with friends or family helps students cope with stress as it gives them an outlet for their worries and a source of support and advice. Further, the moderately high levels of wellbeing found in this study may have functioned as a buffer against the mental health risks of stress. The potential mediating effects of social support and wellbeing on the relationship between stress and mental health need further research since they could be utilized to help students cope with stress and mental health complaints.

A comparably weak prediction of wellbeing from perceived stress was found. A possible explanation for this is that an assumption about the relationship of perceived stress and wellbeing cannot be based on the hypotheses that depression and anxiety are moderate predictors of wellbeing, and perceived stress a moderate predictor of depression and anxiety as they could not be confirmed by the findings. It might also be that there is a variable not measured here which influenced the relationship between perceived stress and wellbeing, such as positive coping behavior (e.g. doing sports to release stress). More research into this topic is necessary to uncover the relations between negative mental health, positive mental health, and stress.

Perceived stress has also almost no predictive power over alcohol use, contrary to the expectation that there would be at least a weak relationship. There is a strong link between stress and alcohol abuse in the literature (Tavolacci et al., 2013), especially among students with low social support (Steptoe et al., 1996). The difficult transition period and the many stressors faced by students are both linked to increased alcohol use (Vaez et al., 2006) since alcohol is often used to cope with stress (Bear, 2002; Park et al., 2004; Cooper et al., 1988). One possible explanation for why this relationship was not recovered in the present study is that the link between alcohol use and the transition period of students (Vaez et al., 2006) applies especially to first-year students, who made up only a third of the sample. Additionally, a reasonable proportion of the student body consists of internationals, who might be affected differently because culture may play a role in alcohol use. It would be interesting to establish which groups of students are most and least affected by the risk of stress-induced alcohol use.

Added Predictive Power from Perceived Stress and Alcohol Use

Surprisingly, the prediction of wellbeing from depression and anxiety was weak, while expected to be moderately strong as also indicated by Westerhof and Keyes (2010) and Lamers

et al. (2015). A possible explanation for this result may be that there is a mediator variable not measured here, such as resilience, social support, or a healthy lifestyle. Perhaps, the influence of mental health complaints on wellbeing can be combatted through wellbeing-promoting (coping) behavior such as talking to a friend or going for a run. Further research is necessary to establish the links between depression, anxiety, and wellbeing.

It was found that perceived stress did not add any predictive power to the prediction of wellbeing from depression and anxiety. This finding is not hugely surprising since symptoms of stress are similar to symptoms of depression and anxiety, which means that no new predictive value is added.

In contrast, alcohol use was expected to add predictive value to the prediction of wellbeing from negative mental health, because drinking behavior is dissimilar from depressive and anxiety symptoms. This prediction was confirmed and offers an interesting starting point for future research.

Limitations

This study has several limitations. The survey was administered during the exam period, which may have caused perceived stress levels to be higher than usual which might have led to a result that is representative of the stress levels during exam periods. Additional points of measurement would be preferred to give a more balanced result. Further, the topic of the research may have led certain individuals to be more likely to participate and others less, which might have implicated the representation of the entire student population of the university. Possibly, students who feel mentally well were not inclined to participate because they had the misconception that they could not contribute to the study. The phrasing in the recruitment e-mail, however, was chosen carefully to reduce this possibility to a minimum. Furthermore, the survey measured more variables than the ones relevant to this study as it was part of a larger research project that the author cooperated with other researchers in, which made it rather long. Therefore, the concentration and motivation levels of the participants may have been implicated. Finally, since the survey was employed online, there was no possibility to control whether participants were influenced by their environment (e.g. loud noise, time-pressure, distractions).

Suggestions for Further Research

It would be interesting to conduct a screening of mental health, stress, and alcohol use at universities in more countries to compare and link the findings with each other. More research into the relationships between stress and wellbeing, stress and alcohol use, and alcohol use and

negative mental health is needed. It is also not yet clear how depression and anxiety are related to wellbeing. Extensive research is needed on wellbeing; e.g. how it relates to negative mental health, how it is influenced by stress, whether it can function as a buffer against stress and other mental health risks, how it expresses itself generally, and how it can be promoted (in students). It is further interesting to explore what factors might mediate the relationship between stress and mental health, such as social support, as suggested by El Ansari et al. (2010). Other mediator relationships should be explored, such as depression as a mediator between stress and alcohol use, as suggested by Camatta and Nagoshi (1995). It would also be interesting to see what the most prominent stressors faced by students are and if there are individual differences in the experience of stress such as biological, social, and cultural factors as previously reported by Baer (2002). In addition, it would be of value to explore how the results of the current study could be used to support students with their experience of stress and mental health complaints as well as help promote their mental wellbeing. For example, an analysis of education policy in several countries suggests that schools should promote wellbeing through curriculum interventions and health-promoting interventions (Bonell et al., 2014).

Conclusion

This study has confirmed that university students suffer from moderately high levels of stress, likely due to several study-specific stressors. The mental health risks of perceived stress in students pose a concern to academic institutions, such as the UT. Perceived stress was found to predict depression and anxiety moderately well, but wellbeing (i.e. positive mental health) only minorly. This study also found a moderate prevalence of depression and anxiety among students - in comparison to the general population - which adds to the concern for the mental health status of the student population in the Netherlands and in general. However, fortunately, students also experienced moderately high levels of wellbeing which is an encouraging finding. Focusing on wellbeing in students is becoming increasingly important as academic demands increase and mental health problems at universities persist (El Ansari et al., 2011). There is still a large gap in research into wellbeing, especially in students, which this study addressed. The relationship between negative and positive mental health was explored and it was found that the former predicts the latter moderately strongly. This finding introduces new questions, such as why positive and negative mental health are not equally strongly predicted by stress. A specific health concern caused by stress in students is alcohol abuse. Some research has suggested that stress may amplify alcohol use and lead to diminished wellbeing, depression,

and other problems. This link was not found in the current study which calls for further research into a possible explanation, such as that wellbeing might function as a buffer against stress or that there are other mediator variables, such as social support. Students are undoubtedly vulnerable to several unique stressors which suggests that they face a greater risk of experiencing mental health complaints. More research into the relationship between stress and mental health is necessary and especially into the role that wellbeing plays in this context.

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