

Loneliness Among Students in Higher Education: Influencing Factors

A quantitative cross-sectional survey research

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Research report

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Preface and acknowledgements

I conducted this research as part of my master Management, Policy-Analysis and Entrepreneurship in Health and Life Science at VU University in Amsterdam. The research was conducted at Student Health Services, a general practitioners office for students attending higher education in Amsterdam. Besides providing medical services, they have a research, development and prevention department. Every year Student Health Services conducts the Student Health Check, investigating the health of students. Students have specific health problems, physical as well as psychological. In the Student Health Check 2015-2016 was found that one of these problems is loneliness. This finding led to the current study.

I would like to thank Peter Vonk and Claudia van der Heijde for giving me the opportunity to do my internship at Student Health Services. Both of them gave me some critical feedback which made my report better every time. I also would like to thank my VU supervisor Renée de Wildt-Liesveld for providing feedback and guiding me in the right direction.

Executive summary

Introduction and contextual background

Students in higher education are an upcoming risk group for loneliness in the Netherlands. The Student Health Check (SHC) showed that no less than 16% of the students attending higher education in Amsterdam experience feelings of loneliness.

Loneliness has significant consequences for health, the academic career and society. It is found to be correlated with personality disorders, psychoses, restricted cognitive functioning, increased risk of Alzheimer disease and is a significant risk factor for depression. Besides psychological health problems, loneliness can lead to severe problems in physical health as well. The most significant is the association between loneliness and cardiovascular health. Studies showed that loneliness is a risk factor for increased BMI, high blood pressure, increased cholesterol levels and diabetes. Moreover, students who suffer from health related issues are more likely to lack academic motivation and fall behind on their courses, causing study delay or even drop out of education. All of the above mentioned problems increase national expenditures on healthcare and education, which makes loneliness among students in higher education a concern for society as well.

Studies that investigate the factors influencing loneliness in this specific population group are scarce. In order to establish effective interventions for reducing loneliness among students, a better understanding of the mechanisms of loneliness among students is required. Therefore, this study aims to make recommendations to Student Health Services for preventing and reducing feelings of loneliness among students higher education students by gaining insight into which factors could influence feelings of loneliness. The corresponding research question is: *Which factors influence feelings of loneliness in higher educational students?*

Theoretical background

The majority of the theories on loneliness look at the phenomenon from a cognitive psychological perspective. An important theoretical model in the field is The Loneliness Model that contains elements of personal characteristics, background variables, characteristics of the social network and the subjective evaluation of the social network as underlying mechanisms in the development of loneliness. The theoretical model used for this research is a combination of the Loneliness Model and additional theories on the mechanisms of loneliness among students. Besides characteristics of the social network and subjective evaluation of the social network, this model focusses on external factors that either contribute to, or reduce feelings of loneliness.

Methodology

The design of this study was a cross-sectional survey research. An online survey was distributed among students attending higher education in the Netherlands. The survey contained a number of validated reliable scales, developed in previous research, that each measured a concept from the conceptual framework. Study participants were recruited through social media (Facebook), through email and through an online newsletter from the general practice of Student Health Services. Eventually, 481 participants who completed the survey were included in the study. Logistic regression analysis was performed to determine the association between the influencing factors and loneliness.

Results

The prevalence of loneliness found in this study was 23%. 72% of the sample was female and the mean age was 22,5 years. The background variables age, gender and type of housing were not significantly associated with loneliness.

With respect to the descriptive characteristics of the social network, the number of close ties and the frequency of contact with friends were significantly associated with loneliness. Participants who had less than five close contacts had a higher odds on being lonely than student who had more than five close contacts. Participants who did not have regularly contact with friends had a higher odds on being lonely than students who did.

The subjective evaluation of the social network (i.e. satisfaction with the social network) was significantly associated with loneliness. Participants who were dissatisfied with their social network were four times more likely to be lonely than students who were satisfied with their social network. Furthermore, participants who desired new relationships were almost three times more likely to be lonely. Moreover, participants who were dissatisfied with the degree of intimacy with the most important contact and participants who wanted to improve this contact were almost two and a half times more likely to be lonely.

The following factors were positively and significantly associated with loneliness: homesickness, negative self-image, extraversion, help-seeking behavior, psychological problems and alcohol abuse. Participants who scored high on these variables were more likely to be lonely than participants who did not.

Besides factors contributing to loneliness, there were two factors that were negatively and significantly associated with loneliness: being a member of a student association and joining a sports club. Students who were undertaking these extracurricular activities were almost half as likely to be lonely than students who did not.

With respect to the concept of intervention and prevention, participants were asked whether they desired professional help in several aspects of four main interventions for reducing loneliness. 55% of the students strongly desired professional help in adapting negative thoughts, 40% in enhancing social skills, 28% in increasing opportunities for social interaction, 26% would like to get in contact with other lonely students and 20% would like to take part in a social support group with peer students.

Discussion

The aim of this research was to gain insight into which factors could influence loneliness in higher educational students. Most finding were in line with previous studies. However, there were some interesting findings. First, this study found, in contrast with existing literature, that extraversion was a factor that may contribute to loneliness. Secondly, this study found that students who are more likely to seek professional help for emotional problems, are more likely to be lonely.

Conclusion

In conclusion, loneliness is a complex subjective phenomenon that is hard to measure since it is highly determined by the way someone evaluates his or her social network. This study indicated several factors that may influence this evaluation of the social network and therefore influence feelings of loneliness. Personality characteristics such as extraversion, negative self-image and social anxiety may contribute to feelings of loneliness. Furthermore, health related factors such as psychological issues and alcohol abuse may also contribute to feelings of loneliness. Specifically in the population of higher educational students, feelings of homesickness may be an important factor for the development of loneliness feelings. Contrary, in order to reduce feelings of loneliness, it may be important for students to take part in extracurricular activities. The knowledge of these influencing factors can be used for addressing those issues that contribute to feelings of loneliness among higher educational students, in order to make student life less lonely for these students

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I. List of abbreviations and acronyms

AUC	Amsterdam University College
AUDIT-C	Alcohol Use Disorders Identification Test
ATSPPHS	Attitudes Towards Seeking Professional Psychological Help Scale
CBT	Cognitive Behavioral Therapy
CI	Confidence Interval
GHSQ	General Help-Seeking Questionnaire
GHQ	General Health Questionnaire
HvA	University of Applied Sciences Amsterdam
IES	Impact of Event Scale
OR	Odd Ratio
SHC	Student Health Check
SHS	Student Health Services
SIAC	Social Interaction Anxiety Scale
UHS	Utrecht Homesickness Scale
UvA	University of Amsterdam
EPQ-S	Eysenck Personality Questionnaire – Short version

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1. Introduction

In 2015, 4% of the people living in the Netherlands was feeling lonely (CBS, 2016). Loneliness appears to be more common in men than in women (5%, and respectively 3%). An upcoming high risk group within the Dutch population are students in higher education (i.e. college and university). According to the Student Health Check 2015 - 2016 (Van der Heijde, Vonk and Meijman, 2016 & 2015), no less than 16% of the students report loneliness as a problem.

Loneliness can lead to severe health issues, physical as well as psychological. It is for example considered as an important risk factor for the development of depression (Cacioppo et. al., 2006; Furr et. al., 2001; Mattanah et. al., 2010). Furr et al (2001) conducted a study on depression and suicide attempt among students in higher education. The study shows that of all participating students who attempted suicide, 47% named loneliness as the main causal factor (Furr et. al., 2001). Besides psychological issues, loneliness also has consequences for physical health. Loneliness is for example associated with a higher risk factor of cardiovascular problems (e.g. elevated blood pressure), a weakened immune system and obesity resulting in metabolic issues (Cacioppo et. al., 2009; Heinrich et. al., 2006). Additionally, lonely students use relatively more substances such as alcohol and drugs than students who are not lonely (Özdemir and Tuncay 2008).

In addition to health issues, there seems to be a relation between loneliness among students and study related problems (Wohn and LaRose, 2014; Mattanah et. al., 2010). A decrease in physical and psychological well-being impacts college adjustment (Hunt et. al., 2010). Especially first year lonely college students are more likely to gain lower academic results than their fellow students who are not lonely (Wohn and LaRose, 2014; Wintre et. al., 2007).

Several possible causes for loneliness among students are described in literature. One of them is the transition from high school to college or university (Moroń, 2014; Wei et. al., 2005). First year students often move to a new city, away from their family environment. This period can be perceived by the student as difficult and stressful (Mattanah et. al., 2010). Another possible cause is the fact that students often have more varying and superficial relationships (Ponzetti, 1990; Özdemir and Tuncay, 2008). Moreover, studies show that lonely students have less social skills than students who are not lonely (Moroń, 2014). Wei and colleagues (2005), for example, found that attachment anxiety is a risk factor for loneliness. Furthermore, students who are lonely often have similar personality traits, such as shyness, low self-esteem, insecurity and introversion, which contribute to feelings of loneliness (Ponzetti, 1990; De Jong Gierveld, 1987).

Although several studies describe the consequences of loneliness among students, studies that describe factors influencing loneliness in this specific population group are scarce. In order to establish effective interventions for reducing loneliness among students, a better understanding of the mechanisms of loneliness among students is required. Therefore, this research aims to make recommendations to Student Health Services for preventing and reducing feelings of loneliness among higher educational students by gaining insight into which factors could influence feelings of loneliness. The corresponding research question is: *Which factors influence feelings of loneliness in higher educational students?*

2. Contextual background

The contextual background will elaborate on the information provided in the introduction. First, the prevalence numbers of loneliness among students will be presented. Secondly, the consequences of loneliness will be explained. Third, a description of the interventions to reduce feelings of loneliness will be provided.

2.1 Prevalence of loneliness

In 2015, nearly 4 of the Dutch population of 15 years and older experienced feelings of loneliness (CBS, 2016). From this 4%, 8% experienced severe feelings of loneliness (CBS, 2016). This study focuses specifically on students attending higher education, which is an upcoming risk group that needs more attention in research on the phenomenon of loneliness.

The Student Health Check (SHC) 2015-2016 (Van der Heijde, Vonk and Meijman, 2016 & 2015) showed that 16% of the participating students reported loneliness as a problem. This suggests a slight decrease in comparison to the Student Health Check 2013-2014 (Van der Heijde, Vonk and Meijman, 2014 & 2015), where this percentage was 17%. The SHC distinguishes different departments from the UvA and the HvA. The departments with the highest percentages of students experiencing feelings of loneliness are UvA Art, Religion & Culture Sciences (33%), UvA Media Studies (30%), UvA philosophy (29%), UvA Social Sciences (29%) and Amsterdam University College (AUC) (25%) (Van der Heijde, Vonk and Meijman, 2016 & 2015). Prevalence numbers of loneliness among students in parts of the Netherlands other than Amsterdam are not available.

2.2 Consequences of loneliness

As mentioned already in the introduction, loneliness is an important risk factor for a range of serious psychological issues (Cacioppo et. al., 2006; Furr et. al., 2001; Mattanah et. al., 2010). It is found to be correlated with personality disorders, psychoses, restricted cognitive functioning, increased risk of Alzheimer disease (Hawkley and Cacioppo, 2010) and is found to be a significant risk factor for depression, depressive symptoms and suicide (Matthews et. al., 2016; Cacioppo et. al., 2010). Examples of depressive symptoms are: feelings of hopelessness, loss of interests, unintentional weight loss or gain, disruptive sleeping pattern, mood swings, fatigue, feelings of worthlessness, sudden reckless behavior and concentration problems (Harvard Medical School, 2009). Besides depressive symptoms, loneliness is an indicator for perceived stress, anxiety, anger and it lowers self-esteem (Cacioppo et. al., 2006). In conclusion, loneliness can cause multiple psychological problems.

Besides psychological health issues, loneliness can lead to severe problems in physical health as well (Goosby et. al., 2013; Hawkley, 2010; Cacioppo, 2009; Heinrich et. al., 2006). The most significant is the association between loneliness and cardiovascular health (Hawkley, 2010). Studies showed that loneliness is a risk factor for increased BMI, increased blood pressure, increased cholesterol levels, and glycated hemoglobin related to diabetes (Hawkley, 2010; Goosby et. al, 2013). Furthermore, a prospective study showed that severe chronic feelings of loneliness was associated with coronary heart disease in women over a follow up period of nineteen years (Thurston and Kubzansky, 2009). Other physical health related consequences are a weakened immune system, metabolic issues, disturbed sleeping pattern (Cacioppo et. al., 2009; Heinrich et. al., 2006) and psychosomatic symptoms as nausea and headaches (Goosby et. al., 2013). Moreover, loneliness is associated with

increased mortality (Hawkey, 2010). The Health and Retirement Study (Shiovitz-Ezra and Ayalon, 2010) indicated that loneliness was a predictor for all-cause mortality over a time period of four years.

In addition to health related issues, feelings of loneliness among students are likely to lead to problems in study progress. A decrease in mental and physical wellbeing has shown to negatively influence the academic achievements of the student (Hunt and Eisenberg, 2010; Wohn and LaRose, 2014; Wintre et. al., 2007). Students who experience feelings of loneliness and suffer from physical or psychological health related consequences are more likely to lack academic motivation and fall behind on their courses, causing study delay or even drop out of education (Hunt and Eisenberg, 2010). Students who experience feelings of loneliness find it harder to adjust to their college or university life than their peer students who do not experience these feelings (Hunt and Eisenberg, 2010; Wohn and LaRose, 2014). The first year as an academic student is especially important since the adjustment during this year has a major impact on the further academic career (Wohn and LaRose, 2014).

The association between loneliness in early adulthood and health consequences later in life makes loneliness an important concern for public health (Goosby et. al., 2013), which impacts the economy (CBS, 2016). The most recent numbers on healthcare expenditures in the Netherlands stem from 2011, when the total healthcare expenditures on psychological illnesses were 19.8 billion euro (CBS, 2016). From this amount, 1.6 billion (8,1%) was spent on the treatment of depression (CBS, 2016). This makes depression, of which loneliness is an important risk factor, one of the most expensive diseases in the Netherlands (CBS, 2016). In addition to increased healthcare expenditures, the study-related consequences of loneliness also increase national expenditures on education. In 2016, the Dutch government spent 6600 euro per student attending higher education (Rijksoverheid, 2016). Overall, loneliness entails many consequences contributing to the economic burden of expenditures on healthcare and education.

2.3 Prevention and interventions targeting loneliness

The impact loneliness has on different aspects of physical and mental health, as well as society, demands for sufficient interventions to reduce and mitigate feelings of loneliness. Four main types of interventions for addressing the problem of loneliness can be identified: enhancing social skills, increasing opportunities for social interaction, providing social support (e.g. social support groups) and addressing maladaptive social cognition (Hawkey et. al., 2010; Masi et. al., 2011). These will be described below.

2.3.1 Enhancing social skills

As mentioned in the introduction, students who experience feelings of loneliness often have less well-developed social skills than their peers who do not experience feelings of loneliness (Moroń, 2014; Masi et. al., 2011). Therefore, a way to decrease feelings of loneliness is training students who are lonely in verbal and non-verbal communication, in making contact with others, in giving and receiving compliments and in overcoming problems with physical intimacy (Masi et. al., 2011). One study (Jones et. al., 1982) investigated a loneliness reduction intervention of improving social skills among college students and showed that after the intervention students were less lonely, less self-conscious in social interactions and more assertive.

2.3.2 Increasing opportunities for social interaction

As a result of insufficient social skills, students who experience feelings of loneliness often have a smaller social network than students who do not experience feelings of loneliness (Masi et. al., 2011). In addition to enhancing social skills, interventions to increase opportunities for social interaction help students to apply their newly developed social skills when meeting new people (Masi et. al., 2011). Examples of opportunities for social interactions are voluntary study groups, student associations and sport accommodations.

2.3.3 Addressing and adapting maladaptive social cognition

A person experiencing loneliness moves along six cognitive steps: “pain and awareness (1), denial (2), alarm and realization (3), searching for causes and self-doubt (4), acceptance (5) and coping (6)” (Rokach and Sha’ked, 2015, p. 102). According to Rokach and Sha’ked (2015), challenging and transforming maladaptive social cognition is the most successful intervention to reduce loneliness. Maladaptive social cognition can be seen as automatic negative thoughts a person has regarding social relationships and negative thoughts about themselves (e.g. ‘I have nothing to say to people.. people won’t like talking to me’) (Hawkley et. al, 2010). Maladaptive social cognition emerges due to ineffective coping skills, resulting in a cycle of negativity (Masi et. al., 2011). Lonely persons interact with greater cynicism and mistrust (Masi et. al., 2011). These maladaptive social behaviors are addressed through cognitive behavioral therapy (CBT) that involves identifying and adapting these negative thoughts (Hawkley et. al., 2010). Interventions that address maladaptive social cognition are recognized as the most important interventions (four times more effective than the other types of interventions) for reducing loneliness feelings, since it deals with the personal issues that cause feelings of loneliness (Masi et. al, 2011).

2.3.4 Social support groups

Social support exists of several elements that provide someone the help they need in specific situations. For example: advice, information, financial support or companionship (Mattanah et. al., 2010; Masi et. al., 2011). Mattanah and colleagues (2010) examined a social support group intervention aimed at comforting the college transition for first year college students. Participants in the intervention group attended a weekly meeting (for nine weeks) during their first year as a student, in which students discussed a topic related to their transition to college (Mattanah et. al., 2010). Examples of such topics are: social networks, balance between study, work and social life, pressure by peers and college, residency, expectations versus reality and old social network (Mattanah et. al., 2010). The sessions were facilitated by peer-students. Mattanah et. al. (2010) found that participants in the intervention group experienced significantly less feelings of loneliness, perceived higher social support and increased college adjustment in comparison to the control group.

3. Theoretical background

The theoretical background explains and unravels concepts that are of importance for this research. The main concept in this study is loneliness, which is extensively investigated by de Jong Gierveld. De Jong Gierveld developed The Loneliness Model (1987). This model is known as an “academic rigorous tool that distinguishes between different causes of loneliness” (Campaign to end Loneliness, 2015, p. 7) and will be described in this chapter. Furthermore, additional theories on the mechanisms of loneliness (i.e. factors that contribute to loneliness and factors that reduce loneliness) will be described. The chapter will end with a conceptual framework in which the concept of loneliness and its influencing factors will be operationalized in light of this research.

3.1 Definitions of loneliness

The term loneliness knows many different definitions. Back in history, philosophers were speaking of positive loneliness (De Jong Gierveld, 1998). They related loneliness to the voluntary withdrawal from social interaction to gain satisfaction in higher goals such as reflection, meditation and belief (De Jong Gierveld, 1998; Hofstätter, 1957). However, this study will not focus on this positive side of loneliness.

According to Perlman and Peplau (1981), “Loneliness is the unpleasant experience that occurs when a person’s network of social relationships is deficient in some important way, either quantitatively or qualitatively” (p.31). This definition focuses on the negative side of loneliness and relates it to the intensity of a person’s experience. A definition that is often used in international literature is the definition of De Jong Gierveld, that takes into account the values, norms and standards in a person’s life and society. According to De Jong Gierveld (1987) “loneliness is a situation experienced by the individual as one where there is an unpleasant or inadmissible lack of (quality of) certain relationships” (p. 120). In this study this definition will be used.

From this definition, three elements can be distracted (De Jong Gierveld, 1987; Schoenmakers, 2013). First of all, loneliness is a subjective phenomenon. Contrary to social isolation, loneliness cannot be measured by the number of relationships a person has, but is rather a feeling. Second, loneliness is always an unpleasant, negative feeling. Third, loneliness arises when the quality of social relationships a person has does not live up to the expectations a person has. For example, someone who has many family members and friends surrounding him can still feel lonely, because the quality of the relationships this person has with these social contacts is not satisfactory (Schoenmakers, 2013).

In addition to the general definition of loneliness, two dimensions of loneliness can be distinguished: emotional loneliness and social loneliness (Weiss, 1973; De Jong Gierveld, 1987). Emotional loneliness emerges when someone misses a close social bond (e.g. partner or best friend), while social loneliness stems from missing a group of contacts or the feeling of not belonging to a specific social group (i.e. family, group of friends).

3.2 The Loneliness Model

Jong Gierveld (1987) developed and tested a theoretical framework for the concept of loneliness that contains elements of personal characteristics, background variables, characteristics of the social network and the subjective evaluation of the social network as underlying mechanisms in the development of feelings of loneliness. The essential aspect of the model is that it emphasizes the

mediating influence of cognitive processes between the characteristics of the social network and the experienced feelings of loneliness. Figure 1 presents the original Loneliness Model (de Jong Gierveld, 1987). The crossed out items were found not to be related to loneliness after testing the model, and were therefore left out in the final model. The concepts presented in the model will be described below, according to the theory of De Jong Gierveld (1987).

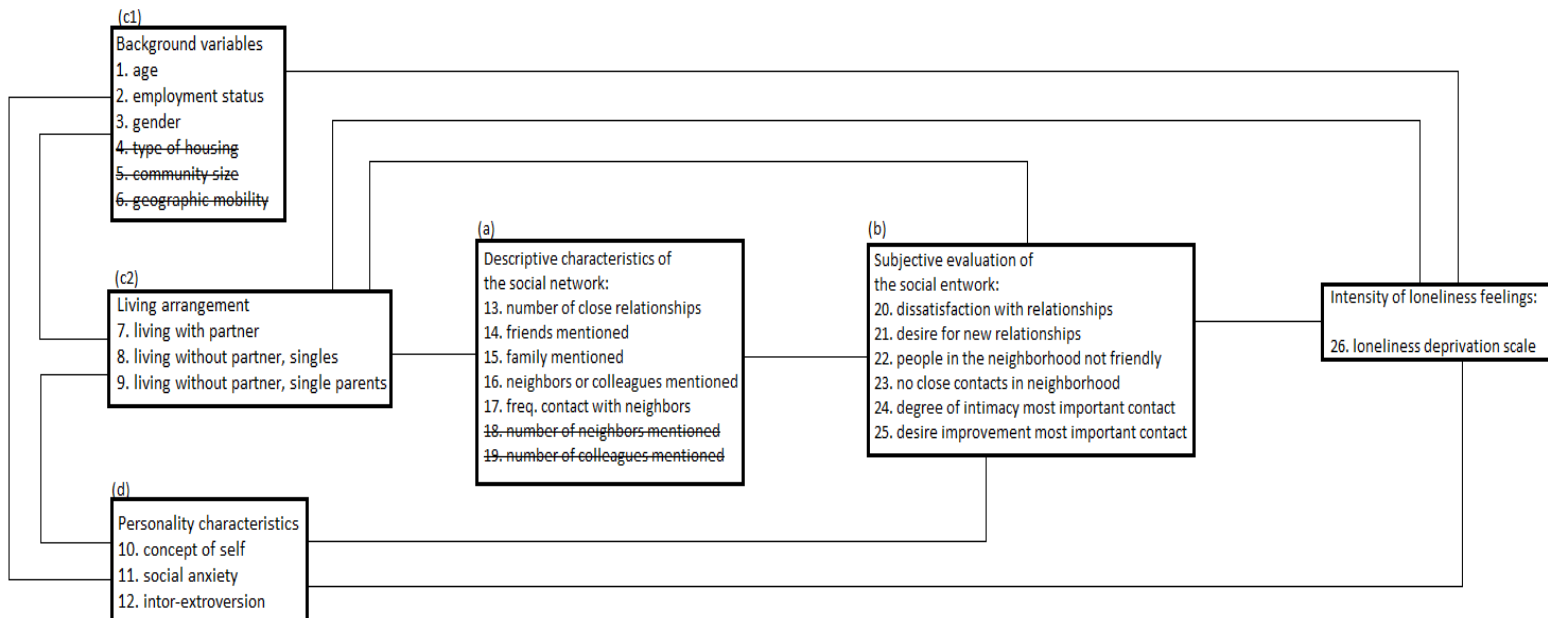


Figure 1. The Loneliness Model (De Jong Gierveld, 1987).

According to The Loneliness Model, the subjective evaluation of the social network (box b) and the intensity of loneliness feelings are influenced by several background variables (box c1). Six background variables were included based on existing literature that suggested a relation between those variables and loneliness. After testing the model, de Jong Gierveld found that the variables type of housing, community size, and geographic mobility had no effects on loneliness. The model was therefore adjusted (i.e. the variables were left out in the final model). The background variables age, employment status and gender did have a significant effect on loneliness.

The box c2 focusses on living arrangements, and influences the descriptive characteristics of the social network (box a), the subjective evaluation of the social network (box b) and the intensity of loneliness feelings. The reason for adopting this concept is the importance of the presence or absence of a partner in predicting loneliness. Being single is found to be a risk factor for developing feelings of loneliness while living with a partner is considered a protective factor for developing feelings of loneliness (De Jong Gierveld, 1987).

Box d involves the following personal characteristics that are related to loneliness: concept of self, social anxiety and intro-extraversion. People with a negative self-image are more likely to experience loneliness. The same goes for people who live with social anxiety and people who are introvert. The important role of personality traits in the Loneliness Model is supported by other studies in which is

stated that students who are lonely often have similar personality traits (Ponzetti, 1990; Perlman & Peplau, 1981; Moroń, 2014). Coalitie Erbij (2016) named personal characteristics such as negative self-image, low self-confidence, feelings of hopelessness, feelings of abandonment, disappointment, sadness, anger, and loss of trust in other people as psychic signals for loneliness. Personality traits can contribute to feelings of loneliness by reducing the desire for having close relationships (i.e. adjust expectations), by provoking behaviors that lead to unsatisfactory social relations, and by causing the person to change social relationships (Perlman & Peplau, 1981). People with those negative kinds of personality traits are less likely to develop social skills to maintain successful relationships (Moroń, 2014), which results in lonely students ending up in a negative vicious cycle. Contrary, students with opposite positive personality traits are more likely to succeed in building and maintaining a satisfying social network (Sawir et. al., 2008).

The box 'descriptive characteristics of the social network' describes variables to examine the type and depth of social contacts. For preventing loneliness, it is crucial to have at least one relationship where there is "a development of joint attitudes and joint behavior and an area of intersection between the two life spaces" (De Jong Gierveld, 1987, p.120). The different types of contacts are family, friends, neighbors and colleagues. However, after testing the model, the number of neighbors and the number of colleagues did not turn out to be related to the subjective evaluation of the social network (box b) and therefore the intensity of loneliness feelings. For this reason, the number of neighbors and the number of colleagues were removed from the final model.

The box 'subjective evaluation of the social network' can be explained as a mediating factor between the characteristics of the social network and the intensity of loneliness feelings. The variables in box b show the most important factors of determining subjective evaluation of the social network and directly influence the intensity of loneliness feelings (De Jong Gierveld, 1987).

The final box in the Loneliness Model presents the phenomenon of loneliness, that was measured through the loneliness deprivation scale (De Jong Gierveld, 1987). This scale specifically measures the "intensity of deprivation feelings concerning relationships with others" (De Jong Gierveld, 1987, p. 122). The loneliness deprivation scales contains questions on the desire to have a close friend or trusted person, feelings of emptiness and feelings of abandonment. The Loneliness Model indicates that loneliness significantly depends on one's expectations and appraisal regarding their social network (De Jong Gierveld, 1987).

De Jong Gierveld (1987) found in her study that the Loneliness Model accounted for 52.3% of the loneliness variance in the dataset. Factors that could account for the rest of the variance in the dataset are not discussed in the article. Nevertheless, 52.3% of explained variance indicates a good fit of the data and therefore supports the model. Moreover, the Loneliness Model is used and supported by several other researchers. Boldero & Moore (1990) for instance, applied the model on Australian adolescents. They found that the model was valid in measuring factors influencing the intensity of loneliness among this population. Interestingly, they found a qualitative difference in the factors influencing loneliness between male and female participants. Females are sensitive to evaluation of their social network especially in relation to one specific same-sex friend, while males are more concerned with the total number of friends, either same-sex or opposite-sex (Boldero & Moore, 1990). One limitation of the Loneliness Model is that it deals with one way causal relations.

This implies that the model indicates the influence of, for instance, personality characteristics on loneliness but not the influence of loneliness on personality characteristics (De Jong Gierveld, 1987).

3.3 Mechanisms of loneliness

Besides the personality characteristics described in the Loneliness Model, a number of studies indicate other factors influencing feelings of loneliness. This subchapter will address additional theories on the mechanisms of loneliness, relevant to the student population.

3.3.1 Culture

Culture is an important external factor contributing to loneliness (Sawir et. al., 2008; Van Staden and Coetzee, 2010; Rokach and Neto, 2005). In 2012, non-western immigrants in the Dutch population were more lonely than western immigrants or natives (60%, 45% and respectively 35%) (CBS, 2012). As stated earlier in this report, loneliness is subjective. Norms and values regarding social relations vary between different cultures and ethnic groups (Coalitie Eerbij, 2016; Rokach & Neto, 2005). For the population of higher educational students, two elements of culture can be distinguished. First, cultural change occurring in international students. Second, the non-help seeking behavior culture of students. Both elements will be described below.

International students (i.e. foreign students studying in another country than the country they live in) experiencing cultural change, have a higher chance of being affected by sociocultural factors (Sawir et. al., 2008). An Australian study found that two third of the participating international students had experienced problems with loneliness or social isolation (Sawir et. al., 2008). According to Sawir and colleagues (2008), there are two different ways in which international students are affected by culture in relation to loneliness. Firstly, many of those students are missing their own culture intensely. Secondly, many of them adjust to new cultures to some level, but never find the same quality relationships as they had with people from their own culture (Sawir et. al., 2008). It appears that the number of relationships with local students is often disappointing for international students (Sawir et. al., 2008).

Besides the cultural change in international students, students in general have a culture of their own when it comes to seeking professional help for physical and psychological problems. Studies of Verouden and colleagues (2010a & 2010b) describe the student paradox: although professional help is available, attainable and mostly free or covered by insurance, students who experience health or study related problems are reluctant to seek professional help. Verouden and colleagues (2010b) explain that students experience a complex phase of their lives in which they seek a new individual and social identity and this process complicates effective help seeking behavior. It appeared that making the decision to seek help for personal problems is not simply a decision between being (or becoming) healthy or not. It is strongly interrelated with the students identity and the context of student life. Students health related identities cause them to have a strong tendency towards solving problems on their own (Verouden et. al., 2010a).

When it comes to feelings of loneliness, it often concerns students who fail to connect with peer students and have difficulties with adapting to the student life (Verouden et. al., 2010a & 2010b). Verouden and colleagues (2010a & 2010b) suggest that students often feel like their health related problems are simply an inevitable consequence of being a student. Student life holds many insecurities and irregularities, resulting in a general view of health as unimportant and low on the list

of priorities (Verouden et. al., 2010a &2010b). Moreover, for a substantial number of students, psychological health related problems such as depression and loneliness started in high school and tend to worsen during their time at college or university. By this time, their health related problems become a pattern that is hard to break. Many of this type of students do not suffer from recently developed health problems but feel like their whole life is a struggle. At this point, seeking professional help feels like a drop in the bucket (Verouden et. al., 2010b).

3.3.1 Situational factors

Several situational factors contribute to feelings of loneliness. First, there are traumatic events, for example loss of loved ones, that can cause the onset of loneliness (Coalitie Erbij, 2016). Second, people can be forced into social isolation which in turn can lead to loneliness (Coalitie Erbij, 2016). Reasons for the occurrence of forced isolation are low income, ill health, disabilities, depression and fear, social exclusion and forced immigration (i.e. refugees) (Coalitie Erbij, 2016). Third, lonely students are more likely to abuse substances, which could worsen already existing feelings of loneliness (Özdemir and Tuncay 2008). Last, and most importantly, the transition from high school to higher education (college or university) can lead to loneliness among students because first year students often move away from their family environment and perceive this transition as stressful and difficult (Moroń, 2014; Wei et. al., 2005).

During the transition from high school to higher education, 50% of the Dutch students experience feelings of homesickness (Stroebe et. al., 2002). Homesickness among students is generally understood as “students missing their parents and family, friends and other familiar persons, their familiar surroundings and home comforts, and feeling extremely insecure” (Stroebe et. al., 2002, p. 148). Homesickness can become a structural problem when these feelings are unacknowledged or unaddressed. Moreover, first year students develop a new identity and experience great pressure in finding new friends. However, group structures and ‘rules’ for socializing are less clear in college and university than in high school (Verouden et. al., 2010). Especially when feelings of homesickness are present, students find it hard to adjust to their new social situation (Stroebe et. al., 2002).

3.3.2 Reducing factors

Lonely students often give their study first priority and experience a lot of pressure to achieve excellent results (Sawir et. al., 2008). As a result, those students distance themselves from social activities notwithstanding the fact that taking part in the social aspects of student life is an important factor in reducing feelings of loneliness (Verouden et. al., 2010). Studies show that extracurricular activities such as having a job, doing volunteer work, being a member of a student association and joining a sports club stimulates social development (Verouden et. al., 2010) which in turn can have a positive effect on reducing loneliness feelings (Masi et. al. 2011). In addition, healthcare professionals, teachers, deans, study advisors and other experts can stimulate students in taking part in such extracurricular activities.

Other factors that can reduce feelings of loneliness are the interventions mentioned already in the contextual background of this report. The four main type of interventions were enhancing social skills, increasing opportunities for interaction, addressing and adapting maladaptive social cognition and social support groups.

3.4 Conceptual framework

The goal of this research is to make recommendations to Student Health Services for preventing and reducing feelings of loneliness among higher educational students by gaining insight into which factors could influence feelings of loneliness. In order to achieve this goal, the concept of loneliness and its contributing and reducing factors have to be operationalized and adjusted to the population of higher educational students.

In this study, the Loneliness Model of De Jong Gierveld (1987) will be used as a basis to determine contributing and reducing factors for feelings of loneliness among students. As explained earlier, this model emphasizes the extent to which someone is satisfied with his or her social network. However, the Loneliness Model does not discuss the above mentioned factors (culture, health and situational factors) that contribute to loneliness nor factors that can reduce feelings of loneliness. Therefore, the Loneliness Model is for the purpose of this research adjusted to the population of students in higher education. The adjusted model is called the Loneliness Among Students Model and is presented in figure 2.

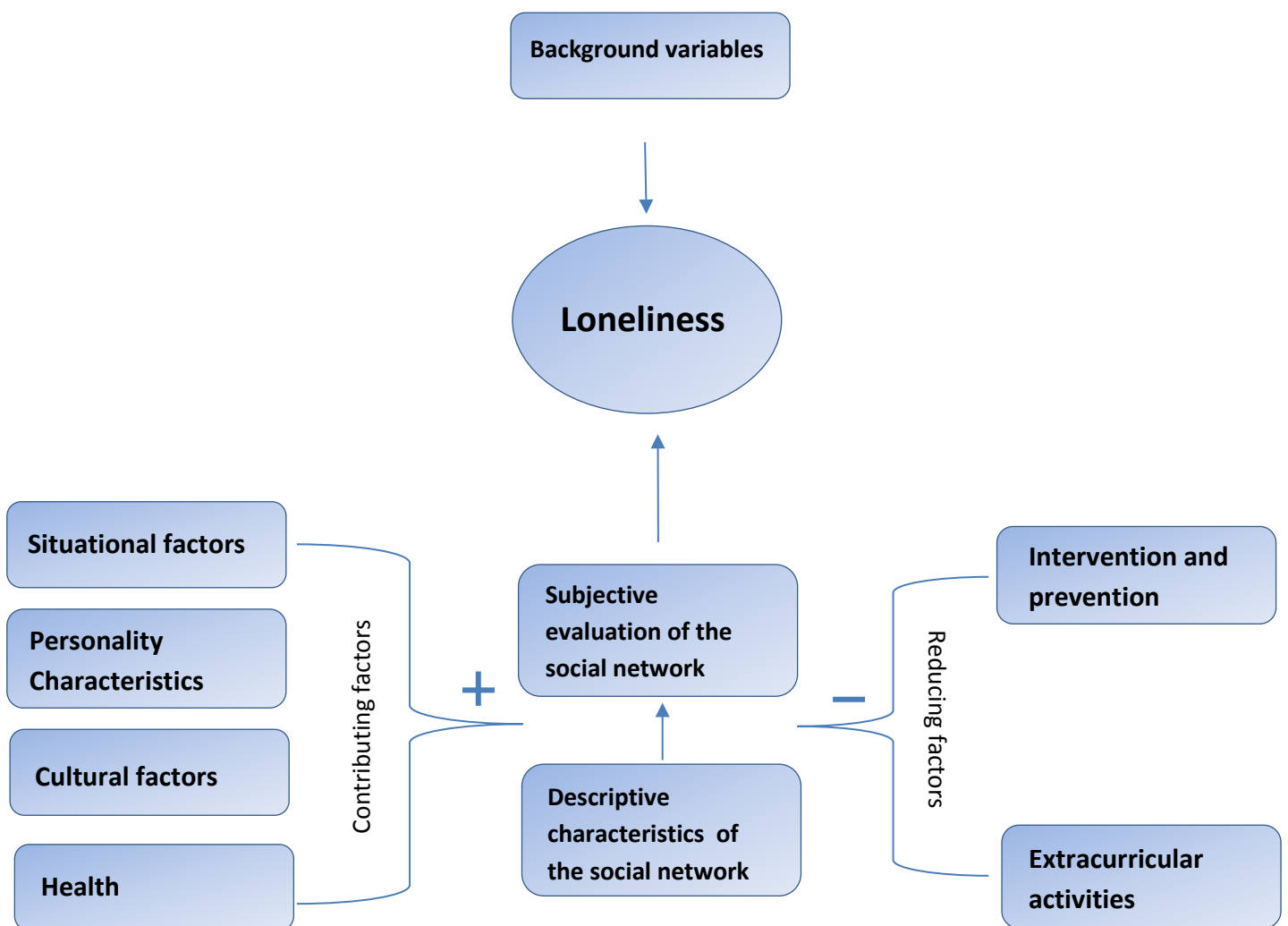


Figure 2. The Loneliness among Students Model

The arrows in the model reflect the relations between loneliness and the different concepts. The concepts subjective evaluation of the social network and the concept descriptive characteristics of the social network are the factors that determine loneliness. In this model, the concepts situational factors, personality characteristics, cultural factors and health negatively influence the descriptive characteristics of the social network and the subjective evaluation of the social network, and therefore contribute to loneliness. Contrary, the concepts intervention and prevention and extracurricular activities positively influence the descriptive characteristics of the social network and the subjective evaluation of the social network, and therefore reduce feelings of loneliness. Furthermore, the background variables can contribute as well as reduce feelings of loneliness. A description of the concepts in the Loneliness Among Students Model will be provided below.

The background variables that may influence feelings of loneliness are gender, age and type of housing. Contrary to the Loneliness Model of De Jong Gierveld (1987), the variable 'employment status' was excluded from this adjusted model since this variable is not a relevant background variable for the population of students (their employment status is 'student'). However, possible jobs students might have besides their study are taken into consideration and were added to the concept extracurricular activities, which will be described later.

The concepts descriptive characteristics of the social network and the subjective evaluation of the social network are unaltered with respect to The Loneliness Model. Descriptive characteristics of the social network are the number of close relationships and the frequency of contact with friends, family members, colleagues and neighbors. The subjective evaluation of the social network is determined by the satisfaction with the social network, the desire for new relationships, the satisfaction with the degree of intimacy with the most important contact and the desire to improve the relationship with the most important contact.

The concepts on the left side of the model are the concepts that contribute to feelings of loneliness. These concepts were added to the Loneliness Among Students model based on the findings in previous studies that investigated mechanisms of loneliness, described earlier in this report. First, situational factors that can contribute to feelings of loneliness are homesickness and traumatic events. Secondly, the three personality characteristics that could contribute to loneliness are negative self-image, introversion and social anxiety. Thirdly, the cultural factors are added to the model since this is an important aspect for the student population. The two cultural factors that may contribute to loneliness are cultural change (i.e. cultural adaptation) and non-help seeking behavior. Fourthly, the concept of health is added to the model. Health related factors are distinguished into three categories: physical health problems, psychological health problems and substance abuse.

The concepts on the right side of the model are the concepts that reduce feelings of loneliness. In this model, the concept of intervention and prevention contains social support groups, intervention programs to address maladaptive social cognition, enhancing social skills and increasing opportunities for interaction to reduce loneliness among students. The other reducing concept is extracurricular activities. Extracurricular activities measured in this study are student jobs, volunteer work, student associations and sports clubs.

3.4.1 Sub-questions

In order to achieve the aim of the research, the following main research question is formulated: *Which factors influence feelings of loneliness in higher educational students?* To answer this main research question, the following sub-questions are formulated based upon The Loneliness among Students Model:

1. To what extent do the background variables (i.e. age, gender and type of housing) influence feelings of loneliness in higher educational students?
2. To what extent do the descriptive characteristics of the social network influence feelings of loneliness in higher educational students?
3. To what extent does the subjective evaluation of the social network influence feelings of loneliness in higher educational students?
4. Which factors (situational, personality characteristics, cultural and health related) contribute to feelings of loneliness in higher educational students?
5. Which factors (e.g. extracurricular activities) could reduce feelings of loneliness in higher educational students?
6. What are the needs of lonely students regarding interventions to reduce feelings of loneliness?

4. Methodology

The methodology will describe and justify the methods chosen for this study. The following aspects will be discussed: the study design, the study population and procedure, the measurements, and the analysis.

4.1 Study design

The design of this study is cross-sectional survey research. The reason for choosing this quantitative approach was the fact that the phenomenon of loneliness has already been extensively studied. However, studies investigating loneliness among the specific target population of students in higher education are scarce. Therefore, the goal of this research was more to validate the theories on loneliness in the population of higher educational students than to investigate individual opinions and perceptions. In other words, this study aimed to gain breadth of knowledge more than in-depth knowledge. To achieve this, a quantitative approach is considered most suitable (Verschuren & Doorewaard, 2010; Kerlinger, 2000).

Advantages and disadvantages in survey research have been taken into consideration. Generating data through questionnaires has several advantages such as low costs, quick data generation, relatively simple analysis compared to qualitative data, and anonymity can be assured (Wright, 2005). In addition, the advantages of questionnaires sent by email or completed through the internet are that the respondent can complete the questionnaire in his or her own time in a place that he or she finds comfortable and the respondent is less likely to give socially desirable answers (Wright, 2005). Nevertheless, using a questionnaire does have disadvantages. For instance, the accuracy of answers cannot be guaranteed, response rate can be extremely low if the questionnaire is too long and there is no opportunity for the participant to ask questions or provide additional comments while filling in the questionnaire (Gillham, 2007).

4.2 Study population and procedure

The study population consisted of students attending higher education. To be included in the study, students had to attend a higher education facility in the Netherlands. Study participants were recruited through social media (Facebook), through email and through an online newsletter from the general practice of SHS. 2200 patients of SHS and 5000 UvA and HvA students received the newsletter with a link to the survey. In addition, 314 participants of the SHC who agreed to be contacted for further research received an invitation email for the current study with a link to the survey. The invitation letters and social media posts for the recruitment of participants can be found in appendix 1. Based on simple size calculations (formula as described in Twisk, 2014), this study aimed at a response of at least 384 participants. Eventually, 486 students completed the online survey. This was a response rate of approximately 7%. Five of the 486 participants were excluded from the study since they were not attending a higher educational facility in the Netherlands. Thus eventually, 481 participants were included in the study.

While conducting this research, several ethical issues were taken into consideration. It was of importance that respondents participated voluntarily and were fully informed about the purpose of this study and potential risks in participating. This information was provided before starting the survey. Furthermore, answers the respondents gave were anonymously and confidentially

processed. The completion of the online questionnaire was taken as a consent for participating in the study.

4.3 Survey

An online survey was developed, using NetQ software (NetQ, 2011), to measure the concepts presented in the Loneliness Among Students Model. The questionnaire included several validated scales developed by other researchers. The scales were selected on validity and internal reliability. Only scales with a Cronbach's alpha (Cronbach, 1960) higher than 0.70 were included. After collecting the data, the Cronbach's alpha for every scale included in this study was measured. In case multiple validated scales were available to measure a concept, the scale with the most appropriate measure for the student population was selected. Since it was expected that the study population included a number of international students, the survey was developed in English as well as in Dutch. For this reason, only scales that had, beside the original English version, a validated Dutch translation were selected. Two scales (the SCAS and the ATSPPHS, which will be described later) did not have a Dutch translation. Since no other accurate alternatives were available, the back-translation procedure (Brislin, 1970) was used. First, the scales were translated into Dutch by one researcher. After this, they were back-translated by a senior researcher that had an excellent comprehension of the English language. For certain concepts, no scales were available or concepts could be measured by single questions (e.g. background variables or extracurricular activities). If this was the case, questions to measure these concepts were developed for the purpose of this research.

4.3.1 Measures

Table 4 provides an overview of the scales used to measure the concepts and shows the corresponding alphas for both the Dutch and English versions of the scales. The English version of the questionnaire can be found in appendix 2. The scales presented in table 4 will each be described briefly.

The two situational factors (i.e. homesickness and traumatic events) were measured by the following scales. Homesickness was measured through the Utrecht Homesickness Scale (Stroebe et. al., 2002). The scale contained 20 items that indicated feelings of homesickness and answers were given on 5-point scale (not – very strong). The total score ranged between 0 and 100. The higher the total score, the more severe the feelings of homesickness. Traumatic events was measured by one single question about whether participants had ever in their lives experienced a traumatic event. If participants answered this question positively, they were asked to fill in the Impact of Event Scale (Weiss, 1997). This scale, containing fifteen items, indicated the probability of posttraumatic stress disorder (PTSD). Answers were given on a 4-point scale (not at all – often). The total score ranged from 0 to 45. A high score indicated a greater probability of PTSD.

The concept of personality characteristics was measured by three scales. First of all, self-image was measured by the Rosenberg Self-Esteem Scale (RSES, Rosenberg, 1965). The scaled contained ten items with answers given on a 4-point scale (strongly disagree – strongly agree). The higher the total score (ranging from 0 to 30) the more positive self-image. Secondly, social anxiety was measured by the Social Interaction Anxiety Scale (SIAS, Mattick et. al., 1998). This scale contained 20 items with a total score ranging from 0 to 80. Participants answered on a 5-point scale (not at all - extremely). A total score of 43 and more indicated social anxiety. Lastly, introversion and extroversion was measured by the extraversion subscale of the Eysenck's Personality Questionnaire (EPQ, Eysenck et.

al., 1992). The scale contained twelve questions that had to be answered with yes or no. The total score on this scale ranged from 0 to 12. The higher the score the more someone had an extravert personality.

The two elements of culture (i.e. cultural change and non-help-seeking behavior) were measured by three different scales. First, the concept of cultural change was measured through the Sociocultural Adaptation Scale (SCAS, Wilson, 2013). The scale contained eighteen items and answers were given on a 5-point scale (not at all competent – extremely competent). The total score was calculated by averaging the individual item scores. A higher score indicated greater competency in a new cultural environment. Secondly, the non-help seeking culture of students was measured by the General Help Seeking Questionnaire (GHQS, Wilson et. al., 2005). This scale consisted of twelve different sources of help (e.g. family, friend, doctor, professor) for which the participants had to indicate on a 7-point scale how likely they were to seek help from these people for personal or emotional problems. The higher the score, the more likely someone was to seek help in times of personal or emotional trouble. In addition, the Attitudes Towards Seeking Professional Psychological Help Scale (ATSPPHS, Fischer et. al., 1995) was used to measure students attitudes towards professional help. The scale contained ten items and participants had to answer on a 4-point scale (disagree – agree). The total score ranged from 0 to 40. A higher score indicated a more positive attitude towards professional psychological help.

Health related factors were divided into three sections: physical health, psychological health and substance abuse. Physical health was measured through the perceived health subscale of the SF-36 Health Survey (Ware et. al., 1992). Answers were given on a 5-point scale (strongly disagree – strongly agree). The total score, with a range of 0-16, was calculated by summing up the individual item scores. Psychological health was measured through the Kessler Screening Scale for Psychological Distress (K-6, Kessler et. al., 2002) and the vitality subscale of the SF-36 (Ware et. al., 1992). The K-6 contains six items regarding depressive symptoms and participants had to answer on a 5-point scale (hardly ever – almost always). The total score was calculated by taking the sum of all individual item scores and ranged from 0-24. The vitality subscale of the SF-36 contained four items with answers given on a 5-point scale (hardly ever – almost always). The total score, the sum of the individual items, ranged from 0-16. The higher the total score the better the vitality. Furthermore, substance (alcohol) abuse was measured through the Audit-C. This scales contained three questions about the use of alcohol. The total score ranged from 0 to 12. A cutoff score of ≥ 4 was used to indicate alcohol abuse.

The last scale used was the Loneliness Scale (De Jong Gierveld, 1987). This scale contained eleven items that measured an emotional loneliness score, a social loneliness score and an overall loneliness score. Answers were given on a 5-point scale (yes! – no!). The total loneliness score ranged from 0 to 11. A score of 0-2 indicated no loneliness. A score of 3-8 indicated moderate loneliness. A score of 9 or 10 indicated severe loneliness and a score of 11 or 12 indicated very severe loneliness. In this study, participants who scored nine points or higher on the scale were coded as lonely. Participants who scored eight points or less on the scale were coded as not lonely. Furthermore, in order to compare the score of the loneliness scale with self-reported loneliness of the respondent, a direct question about whether the respondent felt lonely was included in the questionnaire.

Concept	Scale (Author)	Item example	Cronbach's alpha	
			E* (α)**	D*
Situational factors				
<i>Homesickness</i>	UHS (Stroebe et. al., 2002)	'Feeling uncomfortable in a new situation'	.94 (.95)	.91
<i>Traumatic events</i>	IES (Weiss, 1997 & Ploeg et. al., ...)	'I had trouble falling or staying asleep'	.84 – .92 (.93)	.85 - .96
Personality characteristics				
<i>Self-image</i>	RSES (Rosenberg, 1965)	'I certainly feel useless at times'	.82 (.88)	0.87
<i>Social anxiety</i>	SIAC (Mattick et. al., 1998)	'I have difficulty talking with other people'	.92 (.91)	.92
<i>Introversion-extraversion</i>	EPQ-S; extraversion subscale (Eysenck et. al., 1992)	'Do you enjoy meeting new people?'	.92 (.70)	.85
Culture				
<i>Cultural change</i>	SCAS (Wilson, 2013)	'Building and maintaining relationships'	.92 (.88)	-
<i>Non-help-seeking behavior</i>	GHSQ (Wilson et. al., 2005)	'How likely is it that you would seek help from a mental health professional?'	.70 (.69)	.70
	ATSPPHS (Fischer et. al., 1995)	'Personal and emotional troubles tend to work out by themselves'	.84 (.68)	-
Health				
<i>Physical problems</i>	SF-36 (subscale perceived health) (Ware et. al., 1992)	'I am in excellent health'	.78 (.78)	.78
<i>Psychological problems</i>	K-6 (Kessler et. al., 2002)	'How often did you feel that everything cost too much effort?'	.87 (.87)	.87
	SF-36 (subscale vitality) (Ware et. al., 1992)	'How often did you feel washed out?'	.82 (.82)	.82
<i>Substance abuse(alcobol)</i>	AUDIT-C (Saunders et. al., 1993)	'How often do you have a drink containing alcobol?'	.80 (.72)	.80
Loneliness	The Loneliness Scale (De Jong Gierveld et. al., 1987)	'I miss the pleasure of the company of others'	.80-.90 (.74)	.80-.90

Table 4. Measurement scales and Cronbach's alphas per concept.

*Cronbach's alphas derived from literature. E=English version of the scale; D=Dutch version of the scale.

**The Cronbach's alphas measured in this study (after collecting data).

Table 5 provides an overview of the concepts for which no validated scales were available or concepts that could be measured by a single question. The questions presented in table 5 are developed for the purpose of this research. The concepts background variables (i.e. age, gender and type of housing), health (drug use) and extracurricular activities could easily be measured by one or two single choice questions (as can be seen in table 5). The concept descriptive characteristics of the social network included the number of close ties, the most important contact and the frequency of contact with different social relations. Furthermore, the subjective evaluation of the social network was measured through four questions that reflected someone's satisfaction with his or her social life. Finally, the concept intervention and prevention was measured by single choice questions about the degree to which someone desired professional help in increasing the number of social contacts, addressing negative thoughts, social support groups and enhancing social skills.

Concept	Measure	Item
Background variables		
<i>Age</i>	Open question	'What is your age?'
<i>Gender</i>	Single choice question	'Are you male or female?'
<i>Type of housing</i>	Single choice question	'What is your living situation?'
Descriptive characteristics of the social network		
	Open question	'What is the number of contacts with whom you have close ties?'
	Single choice question	'Who is your most important contact?'
	Scale questions	'What is the frequency of contact with friends/family/colleagues/neighbors?'
Subjective evaluation of the social network		
	Scale question	'I am satisfied with my social network'
		'I would like to get to know more people'
		'I am satisfied with the degree of intimacy with my most important contact.'
		'I would like to improve the relationship with my most important contact'
Health		
<i>Substance abuse (drugs)</i>	Single choice question	'Do you use drugs?'
	Multiple choice question	'How often do you use the following substances?'
Extracurricular activities		
<i>Job</i>	Single choice question	'Do you have a paid (student) job?'
	Single choice question	'Do you work as a volunteer?'
	Single choice question	'How many hours do you work (as a volunteer) per week?'
<i>Student association</i>	Single choice question	'Are you member of a student association?'
	Single choice question	'How much time do you spend at the student association per week?'
<i>Sports</i>	Multiple choice question	'Do you exercise?' (gym, sports club, other)
	Single choice question	'How much time do you spend at the sports club per week?'
Intervention and prevention		
<i>Increase opportunities for social interaction</i>	Single choice questions	'What is the degree to which you desire professional help in: ' '... increasing the number of your social contacts?'
<i>Addressing maladaptive social cognition</i>		'... addressing and adapting negative thoughts about yourself while interacting with others?'
<i>Social support groups</i>		'... taking part in a social support group with peer students.' '... getting in contact with other students who experience feelings of loneliness.'
<i>Enhance social skills</i>		'... enhancing your social skills'
	Open question	'I desire professional help in something else:...'

Table 5. Self-developed questions included in the questionnaire per concept.

4.4 Analysis

Statistical analysis was done by using IBM SPSS Statistics version 23.0. Prior to analysis, variables were examined on missing values and outliers. Missing values and false outliers were excluded from analysis. Descriptive analysis was performed to gain insight in frequencies, means and standard deviations of baseline characteristics of the sample. Stratified descriptive analysis was used to compare the baseline characteristics between the group of lonely students and non-lonely students.

Logistic regression analysis was conducted to determine the association between the influencing factors (independent variables) and loneliness (dependent variable). The outcome variable was dichotomous (0 = lonely and 1 = not lonely). The output was interpreted by the odds ratio (OR), the p-value and the 95% Confidence Interval (CI). In addition, a prediction model, using a manual forward selection procedure, was established to determine the variables that best predict loneliness. These findings were interpreted at the odds ratio, 95% confidence interval and a 5% significance level ($P < 0.05$).

Based on literature, the background variables gender and type of housing were examined on effect modification. This was done by creating an interaction term for these variables. In case the p-value of the interaction term was found to be significant ($p < 0.05$), the results of logistic regression analyses were stratified for the concerning association. Furthermore, the variable psychological problems was a possible confounder in the association between help-seeking behavior and loneliness. In case the regression coefficient changed with more than 10% (Twisk, 2014) after adding the variable psychological problems to the model with help seeking behavior, psychological problems was labeled as an confounding factor in this association.

Furthermore, the assumptions for logistic regression analysis were taken into consideration. First, the outcome variable was dichotomous. Second, continuous and categorical independent variables were analyzed to examine whether there was a linear relation with the dependent variable. In case a non-linear relation was found, the variable was divided into quartiles or a quadratic term was computed.

5. Results

The result section is structured into six parts, corresponding to the sub questions of this study. Firstly, an overview of the descriptive characteristics of the sample is presented. The second part describes the associations between the background variables and loneliness. The third part focusses on the descriptive statistics of the social network and the subjective evaluation of the social network. The fourth and the fifth part show the associations between the contributing factors and loneliness and the reducing factors and loneliness. The final part focusses on the concept intervention and prevention.

5.1 Descriptive characteristics

Table 6 shows the descriptive characteristics of the sample. As shown, the descriptive analysis was stratified to lonely students and non-lonely students. Of all 481 participants, 108 (22.5%) scored nine points or higher on the Loneliness Scale, which indicated severe and very severe loneliness. On the self-reported loneliness question ('Do you feel lonely?'), 27% of all participants indicated to feel lonely (21.6% agreed and 5.4% strongly agreed). Almost three quarters of the study population was female. The participants were aged between 17 and 36 years old. In both groups, the majority of students were in their masters. Furthermore, the majority of the participants lived either with their parents, on their own or with peers. The seven participants who answered 'other' on the question about their type of housing were living with their partner and children. Overall, no outstanding differences in the descriptive characteristics were found between the group of lonely students and the group of non-lonely students.

	All students (n = 481)	Non-lonely students (n = 373)	Lonely students (n = 108)
Age in years (SD)	22.49 (2.869)	22.57 (3.012)	22.23 (2.298)
Female (n(%))	345 (71.7%)	267 (71.6%)	78 (72.2%)
Educational facility (n(%))			
• University of Amsterdam	213 (44.3%)	167 (44.8%)	46 (42.6%)
• University of Applied Sciences Amsterdam	116 (24.1%)	87 (23.3%)	29 (26.9%)
• VU University	41 (8.5%)	30 (8%)	11 (10.2%)
• Amsterdam University College	32 (6.7%)	29 (7.8%)	3 (2.8%)
• Utrecht University	21 (4.3%)	17 (4.6%)	4 (3.7%)
• Tilburg University	8 (1.7%)	6 (1.6%)	2 (1.9%)
• Other	50 (10.4%)	37 (9.9%)	13 (12.0%)
Year of study (n(%))			
• Bachelor 1 st year	77 (16%)	62 (16.6%)	15 (13.9%)
• Bachelor 2 nd year	60 (12.5%)	48 (12.9%)	12 (11.1%)
• Bachelor 3 rd year	98 (20.4%)	81 (21.7%)	17 (15.7%)
• Bachelor 4 th year	81 (16.8%)	58 (15.5%)	23 (21.3%)
• Bachelor >4 th year	13 (2.7%)	9 (2.4%)	4 (3.7%)
• Premaster	8 (1.7%)	7 (1.9%)	1 (0.9%)
• Master	142 (29.5%)	105 (28.2%)	37 (34.3%)
• PhD	8 (1.7%)	6 (1.6%)	2 (1.9%)
International student	75 (15.6%)	68 (18.2%)	7 (6.5%)

Type of housing (n(%))			
• With parents	135 (28.1%)	105 (28.2%)	30 (27.8%)
• Alone	124 (25.8%)	98 (26.3%)	26 (24.1%)
• With peers	161 (33.5%)	128 (34.3%)	33 (30.6%)
• With partner	54 (11.2%)	38 (10.2%)	16 (14.8%)
• Other	7 (1.5%)	4 (1.1%)	3 (2.8%)

Table 6. Descriptive characteristics of the sample

5.2 Background variables

The first background variable measured was gender. As shown in table 7, the difference in the regression coefficient (β) between male and female was 0.32. The corresponding odds ratio (OR) was 0.969. Since male participants were coded as 0 and female participants were coded as 1, male participants had 0.969 times more odds on loneliness than female participants. The corresponding OR was almost equal to 1, meaning that the association found was far from significant ($p = 0.896$).

The next background variable was age. Table 7 shows an OR of 1.044 for the difference of one year in age. In other words, a person who is one year older than another, has 1.044 times more odds on loneliness. Following from this, a person who is five years older than another has 1.24 times more odds on loneliness. However, the association was found not to be significant ($p = 0.279$).

The last background variable measured was type of housing. Table 7 shows that participants who lived alone had 1.124 times more odds on loneliness than participants who did not live alone. Living alone was the reference category in the analysis. This leads to the following interpretations. Participants who lived with their parents had 1.077 times more odds on loneliness than participants who lived alone. Furthermore, participants who lived with peers had 0.972 times more odds on loneliness than participants who lived alone and participants that lived with their children had 2.827 times more odds on loneliness than participants who lived alone. Nevertheless, all the associations found for the different types of housing were not statistically significant.

Variable	Regression Coefficient (β)	Odds Ratio (OR)	95% Confidence Interval (OR)	P-value
Gender	-0.32	0.969	0.601-1.562	0.896
Age	0.043	1.044	0.966-1.128	0.279
Type of housing (living alone)	0.117	1.124	0.683-1.849	0.646
Type of housing (with parents)*	0.074	1.077	0.595-1.948	0.806
Type of housing (with peers)*	-0.029	0.972	0.546-1.731	0.923
Type of housing (with partner)*	0.462	1.587	0.767-3.282	0.213
Type of housing (with children)*	1.039	2.827	0.595-13.428	0.191

Table 7. Logistic regression analysis for the association between loneliness and the background variables.

*compared to the reference category of type of housing: Living alone

Additional analysis was performed to examine effect modification by the background variables. For type of housing, no significant p-values of the interaction terms were found. Gender was an effect modifier in the association between self-image and loneliness, meaning that the effect of self-image on loneliness was significantly different for male and female. Therefore, the results of logistic regression analysis for the association between self-image and loneliness are presented separately for males and females. The results of the analysis performed to examine effect modification can be found in appendix 3.

5.3 Descriptive characteristics of the social network and subjective evaluation of the social network

Logistic regression analysis was performed to determine the association between the descriptive characteristics of the social network and loneliness, and the evaluation of the social network and loneliness. Table 8 shows the results of this analysis. As can be seen in table 8, the number of close ties was significantly associated with loneliness ($p = 0.021$). Participants who had less than five close social ties had 1.946 more odds on loneliness than participants who had five or more close ties. Furthermore, the frequency of contact with friends was significantly associated with loneliness ($p = 0.039$). Participants who did not have regularly contact with their friends had 3.039 times more odds on loneliness than participants who did have regularly contact with their friends. The frequency of contact with family, colleagues and neighbors was not significantly associated with loneliness.

All factors measuring the subjective evaluation of the social network were significantly associated with loneliness. Participants who were dissatisfied with their social network had 4.032 times more odds on loneliness. Participants who desired new relationships had 2.701 times more odds on loneliness. Participants who were dissatisfied with the degree of intimacy with their most important contact had 2.425 times more odds on loneliness and participants who desired to improve the relationship with their most important contact had 2.399 times more odds on loneliness.

Variable	Regression Coefficient (β)	Odds Ratio (OR)	95% Confidence Interval (OR)	P-value
Number of close ties (<5)	0.666	1.946	1.104-3.430	0.021
Frequency of contact with friends	1.111	3.039	1.060-8.695	0.039
Frequency of contact with family	0.564	1.758	0.803-3.849	0.158
Frequency of contact with colleagues	0.089	1.094	0.712-1.680	0.683
Frequency contact with neighbors	-0.039	0.962	0.510-1.817	0.905
Dissatisfaction with social network	1.394	4.032	2.132-7.628	0.000
Desire for new relationships	0.994	2.701	1.711-4.265	0.000
Dissatisfaction with degree of intimacy most important	0.886	2.425	1.206-4.878	0.013

contact				
Desire to improve relationship with most important contact	0.875	2.399	1.538-3.743	0.000

Table 8. Logistic regression analysis for the association between loneliness and the descriptive characteristics of the social network, and for the association between loneliness and the subjective evaluation of the social network. Statistically significant p-values are **bold**.

5.4 Contributing factors

In table 9, the results from logistic regression analysis of the contributing factors from the Loneliness Among Students Model are presented. This section will describe the results of this analysis per (contributing) concept from the Loneliness Among Students model.

The attempt to make a multivariate prediction model to determine the contributing variables that best predict loneliness failed because of the great amount of factors in combination with the lack of participants for certain variables. Therefore, only the results of logistic regression analysis as described above are presented.

5.4.1 Situational factors

The first situational factor measured was homesickness. Homesickness was positively ($\beta = 0.054$) and significantly ($p = 0.011$) associated with loneliness. The corresponding OR was 1.056, meaning that participants who scored one point higher on the Utrecht Homesickness Scale had 1.056 times more odds on loneliness than participants that scored one point lower on the scale. The other situational factor measured was trauma symptoms. Participants who scored one point higher on the Impact of Event Scale had 1.003 times more odds on loneliness than participants that scored one point lower on the scale. The factor trauma symptoms was not significantly associated with loneliness ($p = 0.791$).

5.4.2 Personality characteristics

Three personality factors were measured. The first one was self-image. As mentioned before, analysis for the association between self-image and loneliness was stratified to male and female. The OR of self-image was 1.290 for males and 1.125 for females. This means that males who had a more negative self-image (i.e. one point higher on the self-image scale) had 1.290 times more odds on loneliness than males who had a more positive self-image. In addition, females with a more negative self-image had 1.125 times more odds on loneliness than females with a more positive self-image. The fact that gender was an effect modifier in the association between self-image and loneliness implies that the association between self-image and loneliness was significantly stronger for males than for females. Nevertheless, both associations were statistically significant ($p < 0.001$).

The next personality factor was social anxiety. Social anxiety was positively and significantly ($p = 0.015$) associated with loneliness. Participants who experienced social anxiety had 2.940 times more odds on loneliness than participants who did not.

The last personality factor measured was introversion/extraversion. Table 9 shows the OR for the difference in one point on the extraversion scale. Participants with one point higher on the scale had

1.091 times more odds on loneliness. The higher the score on the scale, the more extravert someone was. Thus, extraversion was positively associated with loneliness and therefore introversion was negatively associated with loneliness. This association was found to be significant ($p = 0.035$).

5.4.3 Culture

As explained before, culture was divided into two dimensions: cultural change and non-help-seeking behavior. Cultural change was measured by the Sociocultural Adaption Scale. Participants who scored one point higher on this scale (i.e. had a better cultural adaption) had 0.978 times more odds on loneliness than participants who scored one point lower. However, this association was not statistically significant ($p = 0.574$).

The student culture was measured through scores on help seeking behavior and attitudes towards help seeking. Help seeking behavior was positively ($OR = 1.031$ per one point difference on the scale) and significantly ($p = 0.013$) associated with loneliness, meaning that students who were more likely to seek professional help were also more likely to be lonely. In addition, the variable psychological problems was examined on confounding in this association. The regression coefficient of help seeking behavior changed with only 7% after adding psychological problems to the analysis. This implies that the variable psychological problems was no confounder in the association between help seeking behavior and loneliness. Similarly to help seeking behavior, a more positive attitude towards help seeking was positively ($OR = 0.001$ per one point difference on the scale) associated with loneliness. In other words, people with a more positive attitude towards help seeking were more often lonely than students with a negative attitude towards help seeking. However, this association was found to be far from significant ($p = 0.947$).

5.4.4 Health

The first health factor measured was physical health. Table 9 shows that participants who had physical health problems had 1.483 times more odds on loneliness than participants who did not. This association was found not to be significant ($p = 0.2$). The second health factor was psychological health. Participants who experienced psychological problems had 1.830 times more odds on loneliness than participants who did not. This association was statistically significant ($p = 0.047$). The third health factor was substance abuse. Alcohol abuse was positively ($OR = 1.745$) and significantly ($p = 0.018$) associated with loneliness. This means that participants who abused alcohol had 1.745 times more odds on loneliness than participants who did not. Furthermore, drug abuse was also positively ($OR = 1.088$) associated with loneliness, meaning that participants who abused drugs had 1.088 times more odds on loneliness than participants who did not. However, this association was found not to be significant ($p = 0.712$).

Variable	Regression Coefficient (β)	Odds Ratio (OR)	95% Confidence Interval (OR)	P-value
Homesickness	0.054	1.056	1.012-1.101	0.011
Trauma symptoms	0.003	1.003	0.981-1.026	0.791
Negative self-image				
male	0.254	1.290	1.143-1.455	0.000
female	0.118	1.125	1.065-1.189	0.000
Social anxiety	1.078	2.940	1.230-7.030	0.015
Introversion	0.087	1.091	1.006-1.184	0.035
Cultural adaption	-0.022	0.978	0.906-1.056	0.574

Help seeking behavior	0.031	1.031	1.007-1.056	0.013
Attitude towards help seeking	0.001	1.001	0.962-1.043	0.947
Physical health problems	0.394	1.483	0.812-2.710	0.200
Psychological health problems	0.604	1.830	1.008-3.323	0.047
Alcohol abuse	0.557	1.745	1.100-2.768	0.018
Drug abuse	0.085	1.088	0.694-1.707	0.712

Table 9. Logistic regression analysis for the association between loneliness and all reducing factors from the Loneliness Among Students Model. Statistically significant p-values are **bold**

5.5 Reducing factors

In table 10, the results from logistic regression analysis for the reducing factors from the Loneliness Among Students Model are presented. This section will describe the results of this analysis per (reducing) concept from the Loneliness Among Students model.

The concept of extracurricular activities consisted of four activities that could reduce loneliness namely, having a (student) job, working a volunteer job, being member of a student association and being member of a sports club. All of these factors were found to be negatively associated with loneliness, meaning that they had a protective effect on loneliness. As shown in table 10, the factors students association and sports club were significantly associated with loneliness ($p = 0.017$ and $p = 0.041$ respectively). Members of a student association had 0.571 times more odds on loneliness than students who were not member of a student association. Furthermore, members of a sports club had 0.652 times more odds on loneliness than students who were not a member of a sports club. Contrary, the factors job and volunteer job were not significantly associated with loneliness.

Variable	Regression Coefficient	Odds Ratio (OR)	95% Confidence Interval (OR)	P-value
Job	-0.129	0.879	0.564-1.370	0.569
Volunteer job	-0.087	0.917	0.554-1.517	0.735
Student association	-0.561	0.571	0.361-0.903	0.017
Sports club	-0.428	0.652	0.396-1.071	0.041

Table 10. Logistic regression analysis for the association between loneliness and all reducing factors from the Loneliness Among Students Model

5.6 Intervention and prevention

Participants who answered 'neutral', 'agree' or 'strongly agree' on the self-reported question on loneliness ($n=250$) were asked whether they would want professional help in several aspects of interventions to reduce feelings of loneliness. As explained earlier, the main types of interventions were increasing opportunities for social interaction, addressing and adapting negative thoughts, social support groups and enhancing social skills. On this subject, five questions were included in the survey. The results of these questions are presented in figure 3 and will be described below.

Firstly, participants were asked to indicate the degree to which they desired professional help in increasing the number of social contacts. 51.6% ($n = 129$) of the participants answered that they did *not at all* desire professional help in increasing the number of social contacts. 20.8% ($n = 52$) of the

participants answered *barely*. 26 % (n = 69) indicated to *strongly* desire professional help in this.

Secondly, in addition to the previous question, participants were asked whether they desired to get help getting in contact with peer students who also experience feelings of loneliness. Almost half of the participants (46%, n = 115) said to *not at all* desire getting in contact with peer students who are also lonely. 27.6% (n = 69) participants barely desired help in this. 26% (n = 66) did *strongly* desire help in getting in contact with other lonely students.

Thirdly, participants were asked to indicate the degree to which they desired professional help in addressing and adapting negative thoughts about themselves while interacting with others. The majority of the participants (55%, n = 133) strongly desired professional help regarding negative thoughts. Contrary, 18.8% (n = 47) of the participants did barely desire professional help in addressing and adapting negative thoughts and 28% (n = 70) did not at all desire help in this. In addition to this question, all 481 participants were asked whether they found psychological therapy, in case they needed this, through the internet a good option for them. 25% of the participants reacted positive to the use of internet for psychological therapy.

Fourthly, participants were asked if they desired to take part in a social support group with peer students. More than half of the participants (54.4%, n = 136) did not at all desire to take part in a social support group with peer students. Additionally, 25.2% (n = 63) of the participants answered *barely* on this question. 20% (n = 51) did strongly desire to take part in a social support group.

Fifthly, participants were asked to indicate the degree to which they desired professional help in enhancing their social skills. 40% (n = 100) of the participants indicated to strongly desire help in enhancing social skills. 35.2% (n = 88) of the participants did not at all desire professional help in enhancing social skills and 24.8% (n = 62) of the participants barely desired help in this.

Students' desires for professional help in several aspects

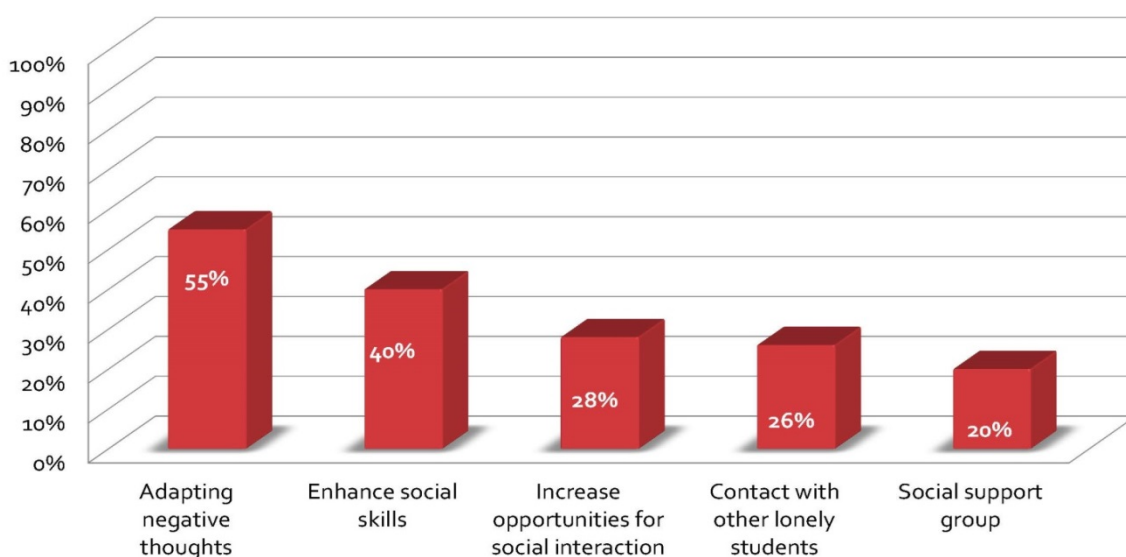


Figure 3. Percentages of lonely students who indicated to strongly desire professional help in several aspects with respect to their feelings of loneliness.

In addition to the previous questions about specific interventions, the participants were asked whether they desired professional help in something else than the above mentioned interventions.

Several subjects came up in this open ended question. 21 participants indicated that they would like professional help in managing their academic life in combination with their social life. Following from this, these participants mentioned to have motivational problems and to struggle with performance anxiety. Furthermore, fifteen participants mentioned that they would like to get professional help in building confidence. Twelve participants mentioned that they struggled with depression and anxiety for which they desired professional help. One participant pointed out to struggle with sexual orientation and desired professional help in this matter.

6. Discussion

The discussion will focus on the main findings of this study. After presenting a short summary of the main findings, these findings will be discussed and compared to previous studies. In addition, this

chapter will reflect on the strengths and limitations of this study and make suggestions for further research. In the end, a conclusion will be drafted and recommendations for practice will be provided.

6.1 Main findings

The aim of this study was to gain insight into the factors that influence loneliness among students in higher education. This study has uncovered several factors that may influence feelings of loneliness. First, the number of close ties, the frequency of contact with friends and the way someone evaluates his or her social network were significantly associated with loneliness. Secondly, a positive and significant association was found between loneliness and the factors homesickness, self-image, extraversion, social anxiety, help-seeking behavior, psychological health problems and alcohol abuse. These factors may therefore contribute to loneliness. Third, being a member of a student association and joining a sports club were negatively and significantly associated with loneliness and may therefore reduce feelings of loneliness. Finally, the results suggest that lonely students desire professional help in adapting negative thoughts about themselves and in enhancing social skills.

6.2 Comparison to other studies

The findings in this study that the degree of satisfaction with the social network, desire for new relationships and desire to improve the relationship with the most important contact were positively associated with loneliness support previous findings of De Jong Gierveld (1987). De Jong Gierveld (1987) theorizes that loneliness is mainly determined by the way a person evaluates his or her social network, rather than the actual number of friends, family members, colleagues and neighbors. The findings also support the study of Perlman and Peplau (1998), that indicates the discrepancy between someone's social needs and someone's actual social relationships as a causal factor for developing loneliness feelings.

In addition to the subjective evaluation of the social network, this study found a situational factor that may contribute to feelings of loneliness: homesickness. This finding is in line with the study of Stroebe and colleagues (2002). They suggested that homesickness causes distress, insecurity and problems in adapting to the new (academic) situation which in turn contributes to feelings of loneliness among students. Furthermore, Urani and colleagues (2003) found a correlation between homesickness and social anxiety in first year college students that make the transition from high school to higher education. This study found that homesickness was mainly present during the first semester and decreased over time. However, students who continued to have feelings of homesickness became more socially anxious (Urani et. al., 2003), which in turn could lead to feelings of loneliness.

Furthermore, this study found that the personality characteristics of negative self-image and social anxiety may negatively influence (i.e. contribute to) loneliness. This is in line with literature of Leitenberg (1990) that explains the association between social anxiety and loneliness. People who struggle with social anxiety are insecure while interacting with others, which limits them in acquiring and maintaining social contacts (Leitenberg, 1990). This in turn contributes to feelings of loneliness. Comparable is the association between negative self-image and loneliness. People with a negative self-image are highly insecure about themselves and do also have negative thoughts about the intentions of other people in social situations (Fein et. al., 1997). Moreover, this study found a

significant difference in the effect of self-image on loneliness between male and females. Although the association between self-image and loneliness was positive for both males and females, the corresponding OR was greater for males. An explanation could be that male lonely participants in this study had a more negative self-image than female lonely participants in this study. To our best knowledge, there are no previous studies that found a similar result. Therefore, more empirical research is necessary to investigate this difference in effect of self-image on loneliness between males and females.

Besides situational factors and personality characteristics, this study found that health related issues such as psychological problems were positively associated with loneliness. This supports previous findings of Granerud and colleagues (2006), in which is stated that people with mental problems have difficulties with social integration. Furthermore, Eisenberg and colleagues (2009) indicated that there is a stigma among psychological health problems, especially in the population of students. Due to this stigma, students with mental issues may feel ashamed to share their feelings with people who could be of help in reducing these feelings (Eisenberg et. al., 2009). All of these aspects may cause a contributing influence of psychological issues on loneliness. In addition, there is a stigma on loneliness causing people to feel ashamed and to feel pressured to have a busy social life (Rotenberg et. al., 1992; Eisenberg et. al., 2009). The increase of the use of social media is likely to play a role in contributing to this stigma (Kim et. al., 2009). However, further research is required to investigate this.

Another health related issue found to be positively associated with loneliness was alcohol abuse. This finding is in line with the study of Midanik and colleagues (2000), in which is explained that alcohol abuse has a negative impact on social relations. However, a number of studies have indicated alcohol abuse as a consequence of loneliness (Akerlind et al., 1992; Özdemir and Tuncay 2008).

In addition to factors that contribute to feelings of loneliness, this study found factors that may reduce feelings of loneliness. Students who were undertaking extracurricular activities as being a member of a student association and joining a sports club were almost half as likely to be lonely than students who did not. This finding supports the study of Verouden and colleagues (2010b) that emphasizes the importance of doing activities besides the study to increase moments of social interaction.

Other factors that could reduce feelings of loneliness are intervention and prevention programs. Interventions that the majority of lonely students in this study desired were adapting and addressing negative thoughts and enhancing social skills. Since no previous studies have been conducted to determine the desires of lonely students regarding interventions to reduce their feelings of loneliness, these findings cannot be compared to existing literature. However, addressing and adapting maladaptive social cognition through cognitive behavioral therapy has been indicated as an effective and important intervention for reducing loneliness feelings (Masi et. al., 2011).

In contrast to the findings discussed above, there were some surprising findings that were contradicting with previous studies. First of all, this study found that extraversion was positively associated with loneliness while previous studies have suggested that not extraversion but introversion contributes to feelings of loneliness. According to Sawir and colleagues (2008) students

who have an introvert personality are more likely to have problems in social interaction than extravert students, which in turn contributes to loneliness. No previous studies have found a contributing influence of extraversion on loneliness. An explanation for this contradicting finding could be that extravert students have more expectations of their social network since they are perceived as outgoing people who enjoy company and need stimulation (Amichai-Hamburger et. al., 2003). Extravert students who find themselves in unexpected moments of being alone, for example in stressful periods during their study, may have more difficulties in handling being on their own than introvert students who are already more content with being in their own company (Amichai-Hamburger et. al., 2003).

Secondly, the finding that positive help-seeking behavior (i.e. students who were more likely to seek professional help for personal and emotional problems) was positively associated with loneliness was contradicting to previous findings of Verouden and colleagues (2010a & 2010b). As explained earlier in the theoretical background of this report, students often simplify their health problems (Verouden et. al., 2010b). This contributes to loneliness when students keep trying to solve problems on their own, or seek help too late (Verouden et. al., 2010a & 2010b). An explanation for the positive association between help seeking and loneliness found in this study might be that lonely students often struggle with other psychological health related problems as well, for which they may already receive help (Cacioppo, 2010). For example, students who have been struggling with feelings of loneliness are likely to develop feelings of depression. In case a large number of lonely students in this sample already received, or has ever received, professional help for psychological issues like depression, they may score higher on the help-seeking behavior scale. Although having psychological problems was found not to be a confounder in the association between help seeking behavior and loneliness, it did cause some of the effect help seeking behavior had on loneliness.

6.3 Strengths and limitations

Several strengths of this study can be acknowledged. First of all, the reliability of the survey used in this study is high. Existing validated and reliable scales have been used to measure the concepts from the conceptual framework. These scales have been widely used in other studies. In addition, the reliability analysis performed in this study showed strong reliability (in the form of Cronbach's alphas) of the scales used. Furthermore, a pilot survey was distributed among five higher educational students and two senior researchers. Their feedback improved the survey and made sure that all questions were understandable and well formulated. Secondly, this study used a theoretical model appropriate for the population of higher educational students. While most theories on loneliness are established from a cognitive psychological perspective, this study also included situational and cultural factors that are relevant to higher educational students and may influence loneliness. Furthermore, this study aimed to not only examine factors that contribute to loneliness but also factors that reduce loneliness in order to provide recommendations on how to tackle the problem of loneliness among students.

The results of this study also need to be interpreted in light of several limitations. Firstly, this study exclusively examined direct influences of the several factors on loneliness while there might be an interaction between them. Creating a prediction model, that would have tackled this problem, failed because of a combination of the large number of factors added to the model and the lack of participants for certain variables. Secondly, this cross-sectional study cannot prove causal relations

between the several factors and loneliness, meaning that there is no certainty regarding the direction (i.e. causality) in the associations found. Thirdly, this study could not sufficiently examine the association between cultural change and loneliness. There was only a small number ($n=7$) of international students who felt lonely among the study participants, which compromised the regression analysis. Fourthly, the majority of the participants in this study (84%) were students studying in Amsterdam. Although there is no clear reason to think that studying in Amsterdam would have a different influence on loneliness than studying in other cities in the Netherlands (e.g. Utrecht and Groningen) and it increased the sample size, a wider distribution of participants among higher educational facilities in the Netherlands would have increased the generalizability of this study.

Taken into consideration the strengths and limitations, this study supports previous findings of factors influencing loneliness and contributes to a greater understanding of the mechanisms of loneliness among students in higher education. Nevertheless, this issue deserves further empirical study. A qualitative research on loneliness among students would be a logical follow up from this study. In-depth knowledge on the thoughts and perceptions of lonely students themselves is required in order to investigate whether lonely students can relate to the findings of the current study. In addition, longitudinal research with a larger sample is required in order to examine causal relationships between influencing factors and loneliness. Furthermore, loneliness seems to be highly prevalent among international students. Since this study was not able to sufficiently investigate this issue, further research with a larger population of international students is required.

6.4 Conclusions

In conclusion, loneliness is a complex subjective phenomenon that is hard to measure since it is highly determined by the way someone evaluates his or her social network. This study indicated several factors that may influence this evaluation of the social network and therefore influence feelings of loneliness. Personality characteristics such as extraversion, negative self-image and social anxiety may contribute to feelings of loneliness. Furthermore, health related factors such as psychological issues and alcohol abuse may also contribute to feelings of loneliness. Specifically in the population of higher educational students, feelings of homesickness may be an important factor for the development of loneliness feelings. Contrary, in order to reduce feelings of loneliness, it may be important for students to take part in extracurricular activities. The knowledge of these influencing factors can be used for addressing those issues that contribute to feelings of loneliness among higher educational students, in order to make student life less lonely for these students.

6.5 Implications for practice

Based on the results of this study in addition with findings from previous studies, the following recommendations are provided to the healthcare professionals from Student Health Services for reducing loneliness among students. First of all, the application of cognitive behavioral therapy has been suggested as an effective intervention for reducing loneliness. The majority of participants in this study strongly desired professional help in adapting and addressing negative thoughts about themselves. Maladaptive social cognition is a common problem in loneliness and it limits lonely students in building and maintaining satisfactory relationships. In establishing an individual cognitive behavioral therapy plan, psychologist should take into account the situational factors, personality characteristics, cultural factors and health related factors that may contribute to feelings of loneliness in the individual.

Secondly, SHS should consider the options for developing and/or providing a training in which lonely students learn to enhance their social skills. Nearly half of the participants in this study strongly desired professional help in enhancing their social skills. Social skills that often need to be improved are verbal and non-verbal communication, engaging in a conversation, making contact with others and receiving compliments. Practicing these social skills with a (health care) professional could help lonely students in being more secure while interacting with others.

Thirdly, there seems to be a stigma on loneliness and the use of social media is likely to play a big role in contributing to this stigma. In order to decrease this stigma and thereby reduce feelings of loneliness, it could be effective to create more awareness among the educational staff of universities and higher educational students themselves. Creating awareness can be done through several ways. Student Health Services can use social media and/or send out newsletters to reach lonely students and provide them with information on loneliness. Another way of creating awareness is by stimulating students to fill in the Student Health Check after which they receive feedback regarding several health issues, such as loneliness. Furthermore, Student Health Services should advise educational staff on how to recognize loneliness and stimulate them to refer lonely students to the general practitioner or student psychologists.

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Appendix 1 Recruitment of participants

The survey of this study was distributed through email and social media (Facebook).

Email invitation for participants of the SHC

For English see below!

Beste student,

Je ontvangt deze mail omdat je een tijdje geleden in de Studentengezondheidstest hebt aangegeven bereid zijn mee te werken aan verder onderzoek. Hartelijk dank hiervoor!

De studententijd wordt vaak omschreven als de beste tijd van je leven. Dit geldt echter niet voor iedereen! Uit de studentengezondheidstest is gebleken dat maar liefst 16% van de studenten gevoelens van eenzaamheid ervaart. Om deze reden doe ik bij Bureau Studentenartsen onderzoek naar dit fenomeen. Doel van het onderzoek is het in kaart brengen van factoren die bijdragen aan gevoelens van eenzaamheid en factoren die deze gevoelens juist kunnen verminderen. Hierdoor ontstaat er meer kennis over eenzaamheid bij professionals en kunnen zij inspelen op passende interventies om eenzaamheid onder studenten aan te pakken.

Graag wil ik je vragen om mij te helpen in mijn onderzoek door een vragenlijst in te vullen. Het invullen duurt ongeveer 10-15 minuutjes en bovendien maak je kans op een Bol.com cadeaukaart t.w.v. 20 euro! Niet onbelangrijk: ook als je niet eenzaam bent kun je de vragenlijst invullen!

→[Start de vragenlijst](#)←

Mocht je vragen of opmerkingen hebben, voel je vrij om contact op te nemen met onderstaande. Alvast ontzettend bedankt voor je tijd!

Joyce Pijpers
j.pijpers@uva.nl
+31 643920806

Huisartsen Oude Turfmarkt | Bureau Studentenartsen

Dear Student,

You receive this email because you participated in the Student Health Check in which you agreed to be contacted for participation in further research. Thank you for this!

College/University life is often described as the best time of your life. However, this does not go for everyone! The Student Health Check showed that no less than 16% of the students experience feelings of loneliness. For this reason, I am conducting a research to this phenomenon at Bureau Studentenartsen (Student Health Services). The aim of the research is to gain insight into the factors that contribute to feelings of loneliness and factors and interventions that could reduce these feelings. With this knowledge, recommendations to healthcare professionals can be made so that they can apply sufficient interventions to tackle the problem of loneliness among students.

You would be of great help spending 10-15 minutes filling in an online survey. Also, you make a chance at winning a Bol.com gift card to the value of 20 euro!

NB: although you might not experience feelings of loneliness, you are welcome to fill in the questionnaire!

→[Start the survey](#)←

Feel free to contact undersigned when you have any questions or remarks. Thank you in advance!

Joyce Pijpers
j.pijpers@uva.nl
+31 643920806

Huisartsen Oude Turfmarkt | Bureau Studentenartsen

Email invitation to UvA and HvA students of the general practice

For English see below.

Beste student,

Studententijd de beste tijd van je leven? Dit geldt niet voor iedereen! Uit de studentengezondheidstest (2015-2016) van Bureau Studentenartsen blijkt dat maar liefst 16% van de studenten aangeeft gevoelens van eenzaamheid te ervaren.

Momenteel doe ik voor mij masterstage onderzoek bij Bureau Studentenartsen om het fenomeen van eenzaamheid te onderzoeken. Doel van het onderzoek is het in kaart brengen van factoren die bijdragen aan gevoelens van eenzaamheid en factoren die deze gevoelens juist kunnen verminderen. Hierdoor ontstaat er meer kennis over eenzaamheid bij professionals en kunnen zij inspelen op passende interventies.

Graag wil ik je vragen om mij te helpen in mijn onderzoek door een vragenlijst in te vullen. Het invullen duurt ongeveer 10 minuutjes en bovendien maak je kans op een Bol.com cadeaukaart t.w.v. 20 euro! Niet onbelangrijk: ook als je niet eenzaam bent kun je de vragenlijst invullen.

→[Start de vragenlijst](#)←

Alvast ontzettend bedankt voor je tijd!

Mocht je vragen hebben, voel je vrij om contact op te nemen met onderstaande.

Joyce Pijpers
j.pijpers@uva.nl
+31 643920806

Dear student,

College life as the best time of your life? This does not go for everyone! The Student Health Check (2015-2016) showed that no less than 16% of the students experience feelings of loneliness. Currently, I am conducting a research at Student Health Services about the phenomenon of loneliness. The aim of the research is to gain insight into the factors that contribute to feelings of loneliness and factors and interventions that could reduce these feelings. With this knowledge, recommendations to healthcare professionals can be made so that they can apply sufficient interventions to tackle the problem of loneliness among students.

You would be of great help spending 10 minutes filling in an online survey. Also, you make a chance at winning a Bol.com gift card to the value of 20 euro!

NB: Although you might not experience feelings of loneliness, you are welcome to fill in the questionnaire!

→[Start the survey](#)←

Feel free to contact undersigned when you have any questions or remarks. Thank you in advance!

Joyce Pijpers
j.pijpers@uva.nl
+31 643920806

Social Media

Facebook:

GEZOCHT: **Studenten (HBO/WO)** die 10 minuutjes tijd hebben om via onderstaande link een vragenlijst in te vullen. Hiermee help je mij enorm met mijn master onderzoek EN maak je bovendien **kans op een Bol.com bon t.w.v. 20 Euro!**

[link naar de vragenlijst]

Bedankt!

WANTED: **Students (HBO/WO)** who are willing to fill in a survey (only 10 minutes!). If you do, you will be a great help in making masters research a success AND you make a **chance on winning a Bol.com gift card to the value of 20 Euro!**

[link to the survey]

Thank you!

The invitations were posted on the following Facebook pages:

- Personal Facebook page of the researcher
- MPA 2016-2018 Facebook page
- Health Science Facebook page

Appendix 2 Survey

English version

Dear student,

First of all, **thank you** for taking the time to participate in the survey!

For my master internship at Bureau Studentenartsen, I am conducting a research about loneliness among students in higher education. The aim of the research is to gain insight in which factors contribute to feelings of loneliness and which factors and interventions could reduce these feelings. Even though you might not experience loneliness, you are welcome to fill in the questionnaire!

It takes about 10 minutes to complete the survey. The questionnaire is completely confidential. Among all participants, **five Bol.com gift cards to the value of 20 euro** will be randomly distributed. If you want to make a chance at winning one of the gift cards, you need to fill in your email address at the end of the questionnaire!

If you have any questions or remarks regarding the research or the survey, feel free to contact the undersigned.

Joyce Pijpers
j.pijpers@uva.nl
0643920806

Section A: background information

What is your age?

years old.

Are you...?

- Male
- Female

What educational facility are you attending?

- University of Amsterdam
- University of Applied Sciences Amsterdam
- VU University
- Amsterdam University College
- Other: ...

At which department are you studying?

In case respondent studied at University of Amsterdam

- Economics and Business
- Faculty of Dentistry (ACTA)
- Faculty of Humanities
- Faculty of Law
- Faculty of Medicine (AMC)
- Faculty of Science
- Faculty of Social and Behavioral Sciences
- Other: ...

In case respondent studied at University of Applied Sciences Amsterdam

- Faculty of Sports and Nutrition

- Faculty of Business and Economics
- Faculty of Health
- Faculty of Applied Social Sciences and Law
- Faculty of Digital Media and Creative Industries
- Faculty of Education
- Faculty of Technology
- Other: ...

In case respondent studied at VU Amsterdam

- Behavioral and Movement Sciences
- Dentistry (ACTA)
- Earth and Life Sciences
- Economics and Business Administration
- Humanities
- Law
- Sciences
- Social Sciences
- Technology
- VUmc School of Medicine

Open question in case respondent studied at other educational facility

What is your current year of study?

- Bachelor 1st year
- Bachelor 2nd year
- Bachelor 3rd year
- Bachelor 4th year
- Premaster
- Master
- PhD
- Other: ...

In what year did you start studying?

- <2013
- 2013
- 2014
- 2015
- 2016
- 2017

Section B: Situational factors

The following questions are about the transition from high school to college or university. Could you please indicate to what extent you have experienced the following situations in the past four weeks?

Only when respondent started studying in 2016 or 2017

Not – weak – moderate – strong - very strong

Longing for acquaintances.
Finding it difficult adjusting to a new situation.
Feeling lonely.
Having thoughts that an old situation was better than here and now.
Missing your family.
Searching for familiar faces.
Feeling unloved.
Feeling uncomfortable in a new situation.
Regretting the decision to leave an old situation.
Continuously having thoughts about home.
Feeling lost in the new situation.
Missing people whom you trust and can talk with.
Feeling isolated from the rest of the world.
Missing home.
Feeling up-rooted.
Feeling missed by your family.
Missing your friends.
Having difficulties in getting used to new customs.
Missing your parents.
Repeatedly thinking of the past.

(Utrecht Homesickness Scale)

What is your living situation?

- I Live with my parents
- I live on my own
- I live with other students/friends
- I live with my partner
- Other: ...

Did you ever in your life experienced a traumatic event¹?

- Yes
- No

Below is a list of difficulties people sometimes have after traumatic events. Thinking about the traumatic event(s) you experienced, please indicate how distressing each difficulty has been for you during the past seven days.

Only when the respondent answered 'yes' in the previous question

Not at all – barely – sometimes – often

I thought about it when I didn't mean to.
I avoided letting myself get upset when I thought about it or was reminded of it.
I tried to remove it from my memory.
I had trouble falling or staying asleep.
I had waves of strong feelings about it.
I had dreams about it.
I stayed away from reminders of it.
I felt as if it hadn't happened or wasn't real.
I tried not to talk about it.

¹ Indirect or direct exposure to actual or threatened death, serious injury or sexual violation or threatened sexual violation (DSM-V).

Pictures about it popped into my mind.
Other things kept making me think about it.
I was aware that I still had a lot of feelings about it, but I didn't deal with them.
I tried not to think about it.
Any reminder brought back feelings about it.
My feelings about it were kind of numb.
(Impact of Event Scale)

Section C: Personal characteristics

The following questions are about your personal characteristics.

For each item, please indicate the degree to which the statement is true for you.

Strongly disagree – disagree – agree – strongly agree

On the whole, I am satisfied with myself.
At times I think I am no good at all.
I feel that I have a number of good qualities.
I am able to do things as well as most other people.
I feel I do not have much to be proud of.
I certainly feel useless at times.
I feel that I am a person of worth, at least on an equal plane with others.
I wish I could have more respect for myself.
All in all, I am inclined to feel that I am a failure.
I take a positive attitude toward myself.

(Rosenberg Self-Esteem Scale)

For each item tick yes or no. There are no right or wrong answers or trick questions.

Yes - No

Are you a talkative person?
Are you rather lively?
Do you enjoy meeting new people?
Can you usually let yourself go and enjoy yourself at a lively party?
Do you usually take the initiative in making new friends?
Can you easily get some life into a rather dull party?
Do you tend to keep in the background on social occasions?
Do you like mixing with people?
Do you like plenty of action and excitement around you?
Are you mostly quiet when you are with other people?
Do other people think of you as being very lively?
Can you get a party going?

(Eysenck's Extraversion Scale)

For each item, please indicate the degree to which you feel the statement is characteristic or true for you.

Not at all – Slightly – Moderately – Very – Extremely

I get nervous if I have to speak with someone in authority (teacher, boss, etc).
I have difficulty making eye contact with others.

I become tense if I have to talk about myself or my feelings.
I find it difficult to mix comfortably with the people I work with.
I find it easy to make friends my own age.
I tense up if I meet an acquaintance in the street.
When mixing socially, I am uncomfortable.
I feel tense if I am alone with just one person.
I am at ease meeting people at parties, etc.
I have difficulty talking with other people.
I find it easy to think of things to talk about.
I worry about expressing myself in case I appear awkward.
I find it difficult to disagree with another's point of view.
I have difficulty talking to attractive persons of the opposite sex.
I find myself worrying that I won't know what to say in social situations.
I am nervous mixing with people I don't know well.
I feel I'll say something embarrassing when talking.
When mixing in a groups, I find myself worrying I will be ignored.
I am tense mixing in a group.
I am unsure whether to greet someone I know only slightly.

(Social Interaction Anxiety Scale)

Section D: Health

The following questions are about your physical health.

How true or false is each of the following statement for you?

Strongly disagree –somewhat disagree – undecided – somewhat agree – strongly agree

I appear to fall ill more easily than other people.
I am just as healthy as other people I know.
I expect my health to deteriorate.
I am in excellent health.

(SF-36 Subscale-perceived health)

Do you suffer from an impairment?

- Yes
- No

Do you have long-term physical and/or psychological problems?

- Yes physical
- Yes psychological
- Both physical and psychological
- No

My impairment or psychological/physical problem impedes me in:

Only if respondents answered 'Yes' on both or one of the two questions above

Never/hardly ever – sometimes – regularly -Often - almost always/always - NA

The day-to-day things (housekeeping, mobility, recreation, hobbies, going out, etc.)

Studying.

Work.

Social contacts (family, relationships, friendships).

(Question Student Health Check)

The following questions concern how you felt in the past 4 weeks.

Hardly ever - sometimes – frequently – often – almost always

How often did you feel nervous?

How often did you feel hopeless?

How often did you feel restless or fidgety?

How often did you feel so gloomy that nothing could cheer you up?

How often did you consider yourself objectionable, inferior or worthless?

How often did you feel everything cost too much effort?

(K-6 -depression)

Did you feel high-spirited?

Did you feel energetic?

Did you feel washed out?

Did you feel tired?

(SF-36 Subscale – vitality)

The following questions concern the use of alcohol and drugs.

How often do you have a drink containing alcohol?

- Never (skip next two questions)
- Monthly or less
- 2 to 4 times a month
- 2 to 3 times a week
- 4 or more times a week

Audit-C

How many units of alcohol do you drink on a typical day when you are drinking?

- 1 or 2 drinks
- 3 or 4 drinks
- 5 or 6 drinks
- 7 to 9 drinks
- 10 or more drinks

(Audit-C)

How often have you had 6 or more drinks on a single occasion in the last year?

- Never
- Less than monthly
- Monthly
- Weekly
- Daily or almost daily

(Audit-C)

Do you use drugs?

- Never (Skip next question)
- Sometimes
- Regularly
- Often
- Very often

How many times have you used the following substances?

never – less than yearly - yearly – every six months – every other month – monthly – weekly - daily

- Hash/weed
- XTC
- MDMA
- 4FMP
- Cocaine
- Amphetamine (speed/pep)
- Ketamine
- LSD
- Opiates
- Truffles
- Paddo's
- Phenylethylamine (o.g. 2C-B, 2C-E)
- Ritalin/Methylphenidate: prescription
- Ritalin/Methylphenidate: non-prescription
- Poppers
- Non-prescription hypnotics and tranquilizers (benzodiazepines e.g. Valium or Seresta)
- Crack cocaine
- Methamphetamine
- Heroine
- Other: ...

Section E: Culture

Below is a list of people who you might seek help or advice from if you were experiencing a personal or emotional problem. Please tick the number that shows how likely it is that you would seek help from each of these people for a personal or emotional problem during the next 4 weeks:

1 = Extremely Unlikely 3 = Unlikely 5 = Likely 7 = Extremely likely
1 – 2 – 3 – 4 – 5 – 6 – 7

- a. Partner (e.g., boyfriend or girlfriend)
- b. Friend (not related to you)
- c. Parent
- d. Other relative/family member
- e. Mental health professional (e.g. psychologist, social worker, counsellor)
- f. Phone helpline
- g. Doctor/GP
- h. Professor/academic advisor
- i. Minister or religious leader (e.g., Priest, Rabbi, Imam, Chaplain)
- j. Chat rooms
- k. I would not seek help from anyone.
- l. I would seek help from another not listed above:

(General Help Seeking Questionnaire)

Please answer the following questions by choosing the best option:

Disagree – Partly Disagree – Partly agree – Agree

If I believed I was having a mental breakdown, my first inclination would be to get professional attention.

The idea of talking about problems with a psychologist strikes me as a poor way to get rid of emotional conflicts.

If I were experiencing a serious emotional crisis at this point in my life, I would be confident that I

could find relief in psychotherapy.

There is something admirable in the attitude of a person who is willing to cope with his or her conflicts and fears without resorting to professional help.

I would want to get psychological help if I were worried or upset for a long period of time.

I might want to have psychological counselling in the future.

A person with an emotional problem is not likely to solve it alone; he or she is likely to solve it with professional help.

Considering the time and expense involved in psychotherapy, it would have doubtful value for a person like me.

A person would work out his or her own problems; getting psychological counselling would be a last resort.

Personal and emotional troubles, like many things, tend to work out by themselves.

Psychotherapy through the internet would be a comfortable opportunity for me.

(Attitudes Towards Seeking Professional Psychological Help Scale)

The following questions are about your cultural background.

What is your ethnic/cultural background? (more answers possible)

- Dutch
- Turkish
- Moroccan
- Surinam
- Antillean
- Indian
- Chinese
- Other: ...

Are you an international or exchange student?

- Yes
- No

Living in a new culture often involves learning new skills and behaviours. Thinking about life in your home country, please rate your competence at each of the following behaviours (**1 = Not competent at all; 5 = Extremely competent**)

Only when respondent answered 'yes' on previous question.

0 – 1 – 2 – 3 – 4 – 5

Building and maintaining relationships.

Managing my academic responsibilities.

Interacting at social levels.

Maintaining my hobbies and interests.

Adapting to the noise level in my neighbourhood.

Accurately interpreting and responding to other people's gestures and facial expressions.

Working effectively with other students.

Obtaining community service I require.

Adapting to the population density.

Varying the rate of my speaking in a culturally appropriate manner.

Gaining feedback from other students to help improve my performance.

Accurately interpreting and responding to other people's emotions.

Finding my way around.

Interacting with members of the opposite sex.

Expressing my ideas to other students in a culturally appropriate manner.
Dealing with bureaucracy.
Adapting to the pace of life.
Changing my behaviour to suit social norms, rules, attitudes, beliefs, and customs.
(Sociocultural Adaption Scale)

Section F: Extracurricular activities

The following questions are about extracurricular activities.

Do you have a payed (student)job?

- Yes
- No

Besides your study, how many hours do you work per week?

Only if respondent answered 'yes' on previous question.

- Less than 4 hours
- 4-8 hours
- 8-16 hours
- 16-24 hours
- More than 24 hours?

Do you have a volunteer job?

- Yes
- No

How many hours a week do you work as a volunteer?

Only if respondent answered 'yes' on previous question.

- Less than 4 hours
- 4-8 hours
- 8-16 hours
- 16-24 hours
- More than 24 hours

Are you member of a student association?

- Yes
- No

How much time do you spend at the student association per week?

Only if respondent answered 'yes' on previous question.

- Less than one day
- 1 day
- 2-3 days
- 4 or more days

Do you exercise? (More options possible)

- No
- Yes, at the gym
- Yes at a sports club
- Yes, other: ...

How much time do you spend at the sports club per week?

Only if respondent answered 'yes at a sports club' on previous question.

- Less than one day
- 1 day
- 2-3 days
- 4 or more days

Section G: Loneliness

The following questions are about your social network and your satisfaction with your social network.

What is the number of contacts with whom you have close ties?

Yes - No

Are any of these individuals friends?

Are any of these individuals family members?

Are any of these individuals colleagues?

Are any of these individuals neighbors?

Are any of these individuals roommates?

Who is your most important contact?

- A friend
- My partner
- A family member
- A colleague
- A roommate
- A neighbor

Never – sometimes – regularly - often - very often

What is the frequency contact with friends?

What is the frequency of contact with family?

What is the frequency of contact with colleagues?

What is the frequency of contact with neighbors?

Strongly disagree – disagree – agree – strongly agree

I am satisfied with my social network.

I would like to get to know more people.

I am satisfied with the degree of intimacy with my most important contact.

I would like to improve the relationship with my most important contact.

Please indicate for each of the following statements, the extent to which they apply to your situation.

Yes! – yes – more or less – no – no!

- There is always someone I can talk to about my day-to-day problems.
- I miss having a really close friend.
- I experience a general sense of emptiness.
- There are plenty of people I can lean on when I have problems.
- I miss the pleasure of the company of others.
- I find my circle of friends and acquaintances too limited.
- There are many people I can trust completely.
- There are enough people I feel close to.
- I miss having people around me.
- I often feel rejected.
- I can call on my friends whenever I need them.

(The Loneliness Scale)

Strongly disagree – disagree – neutral – agree – strongly agree

I feel lonely. ○ ○ ○ ○ ○

Section H: Intervention and prevention

The following questions are about intervention and prevention programmes to reduce feelings of loneliness.

Please tick the degree to which you desire professional help in the following aspects:

Not at all – barely – strongly - very strongly

- Increasing the number of your social contacts.
- Addressing and adapting negative thoughts about yourself while interacting with others.
- Taking part in a social support group² with peer students.
- Enhancing your social skills.
- Getting in contact with other students who experience feelings of loneliness.
- I desire professional help with something else:.....

This is the end of the survey. If you have any comments, you can leave them in the box below:

Please fill in your email address in case you want to make a chance at winning one of the Bol.com gift cards:

Thank you for your time spent taking the survey! Your response has been recorded.

² A social support group is a regularly meeting with peer students in which you learn to handle and reduce feelings of loneliness.

Appendix 3 Results of the analysis of effect modification

Interaction term	Regression coefficient	95% Confidence Interval	P-value
Gender * Homesickness	0.001	0.916-1.094	0.975

Gender * Trauma symptoms	0.061	0.968-1.166	0.200
Gender * Self-image	-0.136	0.764-0.997	0.045
Gender * Social Anxiety	-0.511	0.061-5.898	0.661
Gender * Introversion	-0.039	0.805-1.148	0.665
Gender * Cultural adaption	0.004	0.845-1.192	0.967
Gender * Help-seeking behavior	0.028	0.979-1.081	0.266
Gender * Attitudes towards help seeking	0.042	0.956-1.137	0.349
Gender * Psychological problems	0.100	0.287-4.250	0.885
Gender * Physical health problems	-1.893	0.018-1.295	0.085
Gender * Alcohol abuse	0.590	0.595-5.472	0.297
Gender * Drug abuse	0.201	0.458-3.260	0.689
Gender * Job	0.811	0.838-6.044	0.108
Gender * Volunteer work	0.248	0.410-4.005	0.670
Gender * Student association	-0.950	0.134-1.113	0.078
Gender * Sports club	0.151	0.398-3.395	0.783
Gender * Number of close ties	-0.016	0.908-1.067	0.984
Gender * Frequency of contact with friends	1.273	0.323-3.439	0.299
Gender * Frequency of contact with family	0.067	0.661-1.729	0.785
Gender * Frequency of contact with colleagues	-0.024	0.658-1.448	0.905
Gender * Frequency of contact with neighbors	0.260	0.739-2.276	0.366
Gender * Dissatisfaction with social network	-0.304	0.189-2.885	0.662
Gender * Desire for new relationships	0.049	340.363-3.02	0.928
Gender * Dissatisfaction with intimacy most important contact	0.143	0.272-4.902	0.846
Gender * Desire to improve relationship with most important contact	-0.933	0.143-1.092	0.073

Table A. Results of regression analysis between several factors and loneliness for the examination of effect modification by gender. Significant p-values of the interaction terms are **bold**

Interaction term	Regression coefficient	95% Confidence Interval	P-value
Type of housing * Homesickness	-0.039	0.920-1.005	0.082
Type of housing * Trauma symptoms	-0.007	0.979-1.007	0.315
Type of housing * Self-image	0.000	0.954-1.048	0.999
Type of housing * Social Anxiety	-0.220	0.803-1.832	0.602
Type of housing * Introversion	-0.036	0.890-1.045	0.380
Type of housing * Cultural adaption	0.016	0.993-1.040	0.182
Type of housing * Help-seeking behavior	-0.002	0.975-1.022	0.889
Type of housing * Attitudes towards help seeking	0.002	0.987-1.018	0.780
Type of housing * Psychological problems	0.167	0.647-2.159	0.586
Type of housing * Physical health problems	0.155	0.854-1.613	0.348
Type of housing * Alcohol abuse	0.149	0.755-1.785	0.497
Type of housing * Drug abuse	0.107	0.799-1.553	0.526
Type of housing * Job	-0.149	0.598-1.240	0.422
Type of housing * Volunteer work	0.116	0.807-1.561	0.491
Type of housing * Student association	-0.117	0.558-1.418	0.624
Type of housing * Sports club	-0.239	0.487-1.274	0.331
Type of housing * Number of close ties	-0.001	0.973-1.026	0.955

Type of housing * Frequency of contact with friends	0.002	0.909-1.105	0.962
Type of housing * Frequency of contact with family	-0.013	0.890-1.094	0.805
Type of housing * Frequency of contact with colleagues	-0.062	0.823-1.072	0.355
Type of housing * Frequency of contact with neighbors	0.126	0.933-1.378	0.206
Type of housing * Dissatisfaction with social network	-0.175	0.452-1.561	0.581
Type of housing * Desire for new relationships	0.001	0.651-1.540	0.996
Type of housing * Dissatisfaction with intimacy most important contact	-0.273	0.376-1.540	0.448
Type of housing * Desire to improve relationship with most important contact	-0.138	0.564-1.345	0.533

Table B. Results of regression analysis between several factors and loneliness for the examination of effect modification by type of housing.