Social and emotional loneliness in a large sample of Dutch adults aged 19-65: Associations with risk factors
Hofman, Amy; Overberg, Regina I.; Schoenmakers, Eric C.; Adriaanse, Marcel C.

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Loneliness is common in adults of all ages. Prior research among older adults has shown that social loneliness (feelings of missing a wider social network) and emotional loneliness (missing an intimate relationship) differ in risk factors. Therefore, this study examined risk factors of social and emotional loneliness among adults aged 19-65 years. This study was conducted within the framework of a community-based health study in the northwest of the Netherlands in 2016. Cross-sectional data of 7,885 participants were analysed using structural equation modelling. Social and emotional loneliness were measured using the validated scale of de Jong-Gierveld. Sociodemographic and health-related risk factors were self-reported. Multiple socio-demographic, health indicators and health behaviours were associated with higher scores on both types of loneliness, although the predictive power of multiple risk factors differed by type. Additionally, female gender, younger age, medium or high educational level and smoking were associated with lower social loneliness scores specifically, while having a paid job and lower body mass index were associated with lower emotional loneliness scores. To conclude, associations with risk factors were partly consistent across social and emotional loneliness, however, some important differences have been shown. These differences are important to consider when developing targeted prevention and intervention strategies.

1. Introduction

Loneliness, defined as “a situation experienced by the individual as one where there is an unpleasant or inadmissible lack of (quality of) certain relationships” (De Jong Gierveld, 1987), is common in adults of all ages. Feelings of loneliness are experienced by a third of the Dutch population aged 15 years and over: in 2019, feelings of moderate loneliness were reported by 26% of people and feelings of severe loneliness by 9% (CBS, 2020). Loneliness is associated with negative physical and mental health outcomes such as cardiovascular diseases, depression, impaired cognitive functioning, reduced quality of life, and premature mortality (Boss et al., 2015; Courtin & Knapp, 2017; Leigh-Hunt et al., 2017; Qualter et al., 2015; Richard et al., 2017; Rico-Uribe et al., 2018). The increased risk of these health problems, combined with a reduced social network and less social support (Cohen-Mansfield et al., 2016; Kemperman et al., 2019), may result in increasing healthcare use and costs (Gerst-Emerson & Jayawardhana, 2015; Meisters et al., 2021; Taube et al., 2015).

Empirical evidence has shown that loneliness is not a unidimensional construct. A distinction can be made between emotional loneliness, the feeling of missing an intimate relationship, and social loneliness, the feeling of missing a wider social network (Weiss, 1973). The distinction was later confirmed by studies that have shown that social and emotional loneliness were only moderately correlated (Dahlberg & McKee, 2014), were present in latent class analyses (Hyland et al., 2018), and were differently associated with risk factors and a variety of physical and mental health outcomes (Brandts et al., 2020; Dahlberg & McKee, 2014; Diehl et al., 2018; Hyland et al., 2018; McHugh Power et al., 2018; Nieboer et al., 2020; O’Sullivanabain et al., 2019; Peer-enboom et al., 2015). Regarding risk factors, social loneliness has been associated with, e.g., low physical activity, immigrant background, and male gender (Dahlberg & McKee, 2014; Diehl et al., 2018), while emotional loneliness has been associated with, e.g., not being in a committed relationship, neuroticism and non-receipt of informal care (Dahlberg & McKee, 2014; Diehl et al., 2018; Nieboer et al., 2020; Peerenboom et al., 2015).

Keywords:
Social loneliness
Emotional loneliness
Risk factors
Adults
Structural equation model

A R T I C L E  I N F O

A B S T R A C T

Loneliness is common in adults of all ages. Prior research among older adults has shown that social loneliness (feelings of missing a wider social network) and emotional loneliness (missing an intimate relationship) differ in risk factors. Therefore, this study examined risk factors of social and emotional loneliness among adults aged 19-65 years. This study was conducted within the framework of a community-based health study in the northwest of the Netherlands in 2016. Cross-sectional data of 7,885 participants were analysed using structural equation modelling. Social and emotional loneliness were measured using the validated scale of de Jong-Gierveld. Sociodemographic and health-related risk factors were self-reported. Multiple socio-demographic, health indicators and health behaviours were associated with higher scores on both types of loneliness, although the predictive power of multiple risk factors differed by type. Additionally, female gender, younger age, medium or high educational level and smoking were associated with lower social loneliness scores specifically, while having a paid job and lower body mass index were associated with lower emotional loneliness scores. To conclude, associations with risk factors were partly consistent across social and emotional loneliness, however, some important differences have been shown. These differences are important to consider when developing targeted prevention and intervention strategies.
Based on this distinction, it has been suggested that the needs of people that suffer from social loneliness might be different from those that suffer from emotional loneliness (Weiss, 1973). In line with this, intervention strategies have been shown to be more effective when targeted to the specific type of loneliness (Bessaha et al., 2020; Gaggioli et al., 2014). For prevention and intervention purposes, it is thus essential to identify high-risk groups for each subtype of loneliness. However, risk factors were mainly studied for the general construct of loneliness, i.e., not taking into account the differences between social and emotional loneliness (Dahlberg et al., 2022; Lim et al., 2020). Only few studies assessed a wide range of risk factors specified for social and emotional loneliness, and these studies mainly focused on specific age groups such as older adults (Dahlberg & McKee, 2014), or university students (Diehl et al., 2018). Knowledge about those risk factors in the general adult population is lacking. Therefore, the aim of the study is to examine the risk factors of social and emotional loneliness among adults aged 19-65 years in the Netherlands. These findings could contribute to current knowledge and might improve future prevention and intervention strategies, in order to curb the number of adults that suffer from social or emotional loneliness.

2. Methods

2.1. Study design and population

This study was conducted within the framework of a community-based health study carried out in the northwest of the Netherlands in 2016 (region of Kennemerland; approximately 600,000 inhabitants). The overall aim of this survey was to monitor the health status of adults living in the region, which is also induced by the national public health law. The Medical Ethics Committee of the Academic Medical Center in Amsterdam was informed about the study protocol of the community-based health study and deemed that approval was not needed (GGD, CBS & RIVM, 2016).

Participants were randomly sampled from the municipality registry of the ten municipalities within the region of Kennemerland. Some municipalities were oversampled in order to provide more detailed information, e.g., within neighbourhoods. Participants were sampled from private households only. Individuals living in a nursing home, mental health institution, prison or asylum were excluded. Between October and December 2016, 27,023 adults aged 19 to 65 years were invited to participate, of which 8,319 agreed (31%). Of these, we excluded participants with any missing item(s) on the social and emotional loneliness scales (N = 434), leaving 7,885 participants for analysis.

2.2. Measurements

Data were obtained from questionnaires, that were first sent out digitally. After three weeks, a reminder was sent to participants who did not respond and participants were invited to fill in a printed version.

2.2.1. Social and emotional loneliness

Social and emotional loneliness were measured using the 11-item loneliness scale by De Jong Gierveld (De Jong Gierveld & Kamphuis, 1985). The scale has shown to be a reliable and valid instrument in the measurement of loneliness (Penning et al., 2013; van Tilburg & de Leeuw, 1991). Moreover, some studies have shown that the scale can be regarded as an appropriate bi-dimensional scale for social and emotional loneliness (De Jong Gierveld & Kamphuis, 1985; De Jong Gierveld & Van Tilburg, 2010; Van Baarsen et al., 2001).

2.2.2. Social loneliness

The scale consists of five positive items referring to social loneliness (De Jong Gierveld & Kamphuis, 1985). An example is “I can rely on my friends whenever I need them”. The response options for participants are ‘no’, ‘more or less’, and ‘yes’. The final score ranges from 0 to 5 and Cronbach’s α demonstrated good internal consistency (Cronbach’s α = 0.83).

2.2.3. Emotional loneliness

The scale consists of six negative statements referring to emotional loneliness (De Jong Gierveld & Kamphuis, 1985). An example is “I experience a sense of emptiness around me”. The final score ranges from 0 to 6 (Cronbach’s α = 0.88).

2.2.4. Risk factors

Risk factors were selected based on literature (Arpin et al., 2015; Dahlberg et al., 2022; Dyal & Valente, 2015; Lim et al., 2020; Pels & Klei, 2016). A potential risk factor was included when both an association with the general construct of loneliness was found in previous studies and this risk factor was available in the survey. Except for age and ethnicity, which were provided by Statistics Netherlands, all measurements were self-reported by the participants. The risk factors were subdivided into three categories: ‘socio-demographics’, ‘health indicators’ and ‘healthbehaviours’ (Table 1).

2.3. Statistical analysis

First, study sample characteristics were described for the total population and by age group. The following age groups were used: 19-34 years (early adulthood), 35-49 years (midlife adulthood) and 50-65 years (mature adulthood), according to the developmental stages as described by Armstrong (Armstrong, 2007).

Hereafter, a structural equation model (SEM) was used to assess the associations with risk factors for each type of loneliness. As social and emotional loneliness are described as related but distinct constructs, we used SEM to account for the correlation between social and emotional loneliness and their risk factors by assessing all pathways in a single model. Social and emotional loneliness were included as latent variables, based on the questionnaire items referring to each construct (Figure 1). Both the social and emotional loneliness scores showed a skewed distribution (the majority of participants scored close to 0). To adjust test statistics and standard errors for the potential bias due to non-normality, the robust maximum likelihood estimator was used (Curran et al., 1996; Finney & DiStefano, 2006; Satorra & Bentler, 1994). Then, we included a pathway that represents the correlation between the two latent constructs of social and emotional loneliness. Finally, a multi-variate regression model was included for each type of loneliness, associating them with all potential risk factors (Figure 1). We used the robust Full Information Maximum Likelihood estimator to make sure all available data was preserved, and listwise deletion of participants with missing data was prevented (Rosseel, 2012). Model fit was assessed by the following indices: comparative fit index (CFI, sufficient if greater than 0.90), Tucker Lewis index (TLI, if greater than 0.90), root-mean-square-error of approximation (RMSEA, if lower than 0.06) and standardised root mean square residual (SRMR, if lower than 0.08) (Hu & Bentler, 1999). Associations with risk factors were presented by showing their standardized coefficients and 95%-confidence intervals (95%CI). Standardized coefficients were preferred in order to compare the estimates for each type of loneliness as the scales for the types are different (0 – 5 for social loneliness versus 0 – 6 for emotional loneliness).

As an additional analysis, we evaluated whether results differed by age group, as previous studies suggested the risk factors of loneliness to differ by age (Beutel et al., 2017; Lagaard et al., 2016; Luhmann & Hawley, 2016). We compared the original model to a model with estimations for each age group separately (again, the age groups used were: 19-34 years, 35-49 years, 50-64 years). Based on their Bayesian Information Criterion (BIC) values, we concluded that including age groups did not improve the overall model. Therefore, we presented final results for the total population and then, visualized results by age group in supplemental figures. Data analyses were performed using IBM SPSS.
Table 1
Measures of included risk factors.

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Scale (unit/categories)</th>
<th>Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socio-demographics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Male; female</td>
<td>Single question</td>
</tr>
<tr>
<td>Age</td>
<td>Continuous (years)</td>
<td>Registry data</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Natives; western immigrant; non-western immigrant</td>
<td>Registry data</td>
</tr>
<tr>
<td>Marital status</td>
<td>Married or living together with partner; not married or living alone</td>
<td>Multiple questions on marital status and living situation</td>
</tr>
<tr>
<td>Children in household</td>
<td>Yes; no</td>
<td>Single question</td>
</tr>
<tr>
<td>Educational level</td>
<td>Low; medium; high</td>
<td>Single question based on Dutch educational levels</td>
</tr>
<tr>
<td>Working status</td>
<td>Not working at all; no job but different daily activities; working at least 1h/week</td>
<td>Single question</td>
</tr>
<tr>
<td>Income comfort</td>
<td>No or small difficulties to make ends meet; some or much difficulties to make ends meet</td>
<td>Single question</td>
</tr>
<tr>
<td>Health indicators</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor perceived health</td>
<td>(Very) well; acceptable or (very) bad</td>
<td>Single question</td>
</tr>
<tr>
<td>Functional limitations</td>
<td>Not limited in daily life; limited or severely limited in daily life 0 diseases; 1 disease; ≥2 diseases</td>
<td>Single question</td>
</tr>
<tr>
<td>Chronic diseases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychological distress</td>
<td>Continuous (score 10-50, higher score refers to more psychological distress)</td>
<td>K10-questionnaire</td>
</tr>
<tr>
<td>Having suicidal thoughts</td>
<td>No suicidal thoughts; having suicidal thoughts, from occasionally to regularly</td>
<td>Single question</td>
</tr>
<tr>
<td>Sense of mastery</td>
<td>Continuous (score 7-35, higher score refers to a higher sense of mastery)</td>
<td>Pearlman Mastery Scale</td>
</tr>
<tr>
<td>Giving informal care</td>
<td>Yes; no</td>
<td>Multiple questions, based on Dutch definition of being an informal caregiver</td>
</tr>
<tr>
<td>Body mass index</td>
<td>Continuous (kg/m²)</td>
<td>Double question on height and weight</td>
</tr>
<tr>
<td>Health behaviours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drinking behaviour</td>
<td>No excessive drinking; excessive drinking</td>
<td>Multiple questions, based on Dutch definitions of excessive drinking</td>
</tr>
<tr>
<td>Smoking</td>
<td>Current non-smoker; current smoker</td>
<td>Single question</td>
</tr>
<tr>
<td>Physical activity</td>
<td>Conform national guidelines; not conform national guidelines</td>
<td>Multiple questions, based on Dutch guidelines</td>
</tr>
</tbody>
</table>

1. Kessler et al. (2002)
2. Pearlin & Schooler (1978)
3. taking care of someone from your own network for more than 8 hours a week or for a period lasting 3 months or more
4. more than 14 glasses per week for males and more than 7 glasses per week for females
5. Dutch physical activity guidelines as were applicable in 2016: being physically active for 30 minutes on at least 5 days of the week.

3. Results

3.1. Study sample characteristics

Study sample characteristics are presented in Table 2. A total of 7,885 participants were included, of which 4,491 (57%) were female. The majority of the study population was native Dutch (84%) and most of the respondents were married or living together with a partner (75%).

Regarding age, more than half of the study population was aged 50-64 years (19-34 years: N=1,476, 35-49 years: N=2,397, 50-64 years: N=4,013). The mean scores of social loneliness (scoring range 0 to 5) and emotional loneliness (scoring range 0 to 6) in the total sample were respectively 1.51 and 1.07.

3.2. Structural equation model results

The structural equation model showed sufficient model fit, based on CFI (0.96), TLI (0.95), RMSEA (0.03) and SRMR (0.02). All of the questionnaire items were significantly associated to the latent construct of the corresponding type of loneliness (p<0.001). Also, social and emotional loneliness were significantly associated (β=0.64, 95%CI: 0.61;0.66, p<0.001).

3.2.1. Social and emotional loneliness

In Table 3, standardized coefficients (β) and confidence intervals derived from SEM were presented. For risk factors that were associated with both types of loneliness with similar effect sizes, we present the results for social loneliness here in text. Regarding risk factors that were associated with both types of loneliness, being immigrant (social loneliness: β=-0.07, 95%CI: 0.05;0.10 for western immigrant, β=-0.10, 95%CI: 0.08;0.13 for non-western immigrant) and having difficulties to make ends meet (income comfort, social loneliness: β=-0.04, 95%CI: 0.02;0.07) were associated with higher loneliness scores with equal effect sizes. Similarly, for lifestyle factors, i.e., excessive drinking (social loneliness: β=-0.03, 95%CI: -0.05;0.00) and performing physical activity conform guidelines (social loneliness: β=-0.03, 95%CI: -0.06;-0.01) were associated with lower social and emotional loneliness scores with comparable effect sizes. However, the effect size of being unmarried or living alone was larger for the association with emotional loneliness (β=0.13, 95%CI: 0.11;0.16), just as associations with psychological distress (β=0.32, 95%CI: 0.28;0.35) and having suicidal thoughts (β=0.11, 95%CI: 0.08;0.15). On the other hand, associations with poor perceived health (β=-0.06, 95%CI: 0.03;0.09), having 2 or more chronic diseases (β=-0.05, 95%CI: -0.08;-0.02) and sense of mastery (β=-0.17, 95%CI: -0.20;-0.14) showed larger effect sizes for social loneliness.

Regarding risk factors that were specifically associated to one type of loneliness, female gender (β=-0.12, 95%CI: -0.14;0.09) and medium (β=-0.05, 95%CI: -0.08;0.02) or high (β=-0.06, 95%CI: -0.09;0.03) educational level were associated with lower social loneliness scores while higher age (β=0.11, 95%CI: 0.08;0.13) and smoking (β=0.03, 95%CI: -0.06;0.01) were associated with higher social loneliness scores. On the other hand, having a paid job (working status, β=-0.06, 95%CI: -0.10;-0.03) was associated with a lower emotional loneliness score, while higher body mass index (β=-0.06, 95%CI: -0.10;-0.03) was associated with a higher emotional loneliness score.

3.2.2. Differences by age group

Stratified results by age group (19-34 years; 35-49 years; 50-64 years), as derived from structural equation models, are presented in supplemental Figure 1 and 2. For most of the associations between risk factors and social or emotional loneliness, associations were in the same direction across age groups and effect sizes did not differ substantially, i.e., confidence intervals did largely overlap. However, some notable differences across age groups were shown. First, medium (β=-0.19, 95% CI: -0.28;-0.11) and high (β=-0.20, 95% CI: -0.29;-0.11) educational level was associated with a lower social loneliness score particularly in the age group 19-34 years. Also, work status showed quite some differences across age groups. Particularly, doing different activities (β=-0.09, 95% CI: 0.05;0.14, compared to no work/activities) was associated with higher social loneliness scores in the age group 35-49 years.
4. Discussion

In this cross-sectional survey study, associations with risk factors were partly consistent across types of loneliness, however, some important differences have been found. Effect sizes differed by type of loneliness and some risk factors were found to be significantly associated with one specific type of loneliness: female gender, younger age, medium or high educational level, and being a current smoker were associated with lower social loneliness score specifically, while having a paid job and lower body mass index with lower emotional loneliness score. Although we did not find significant evidence for age group differences, some risk factors had remarkably greater predictive power in specific age groups.

Social and emotional loneliness were associated with a wide range of socio-demographic risk factors, health indicators and health behaviours in our adult population (19-65 years). In line with previous studies, psychosocial risk factors were important correlates for both types of loneliness (Dahlberg & McKee, 2014; Diehl et al., 2018). Also, being married or living together was consistently reported as a protective factor for emotional loneliness, and male gender was previously related to higher social loneliness scores among older adults (Dahlberg & McKee, 2014; Diehl et al., 2018). Regarding body mass index and health behaviours, we could only compare our results to those of a study among university students (Diehl et al., 2018). In consistency with the results among students, we observed lowest loneliness scores in those within the normal range of body mass index. Also, we observed lowest loneliness scores in those who were drinking, smoking, and performing sufficient levels of physical activity, although not all associations were statistically significant. So far, results on drinking and smoking behaviour in relation to loneliness have been inconsistent (Arpin et al., 2015; Dyal & Valente, 2015; Wootton et al., 2021), however, we could speculate that smoking and drinking are to some extent related to participation in social contacts and activities, which could explain our findings. However, as studies into risk factors for social and emotional loneliness were performed in different age groups, i.e., university students, adults (19-65 years), and older adults (>65 years), some results might be specific to age or phase of life. For example, in contrast with our results among adults, community care (in our study referred to as informal care) was found to be associated with loneliness among older adults (Dahlberg & McKee, 2014), which might be specific to the age group.

Additionally, we compared our results to correlates that has been linked to the general construct of loneliness in systematic reviews (Dahlberg et al., 2022; Lim et al., 2020). Regarding socio-demographic risk factors, age, gender, marital status, living status, socio-economic status (including lower educational level and lower income) and migration status were presented as known and emerging correlates. Interestingly, these correlates largely overlap with our findings, however, we found some to be specifically or more importantly associated with one specific type of loneliness. For example, male gender was specifically associated with social loneliness, and being unmarried/living alone appeared to be more importantly related to emotional loneliness. These associations could partly be explained by the definitions of the subtypes: e.g., being unmarried/living alone could be directly linked to the concept of emotional loneliness. Male gender might be less clearly associated with social loneliness, although this finding has been reported previously (Dahlberg & McKee, 2014; Dykstra & Fokkema, 2007; Heylen, 2010). Possible explanations for this finding are differences between men and women in building and maintaining social networks, and/or a gender bias in the way social loneliness scale items are interpreted and answered (Dahlberg & McKee, 2014; Dykstra & Fokkema, 2007; Heylen, 2010).

Regarding health indicators, poor physical and mental health were previously presented as correlates of the general construct of loneliness (Dahlberg et al., 2022; Lim et al., 2020). Again, these correlates are in line with our findings, but we have shown some psychosocial factors to be more strongly associated with emotional compared to social loneliness, e.g., psychological distress and having suicidal thoughts. These latter findings agree with those of Peerenboom et al., (2015) and Hyland et al., (2018), who concluded that depression was most importantly associated with emotional loneliness (Hyland et al., 2018; Peerenboom et al., 2015). Possible explanations for this finding are differences between men and women in building and maintaining social networks, and/or a gender bias in the way social loneliness scale items are interpreted and answered (Dahlberg & McKee, 2014; Dykstra & Fokkema, 2007; Heylen, 2010).
They have reported that missing an intimate relationship with someone (emotional loneliness) is closely related to depression, either as a predictor or a consequence, while broader social integration (more linked to social loneliness) might be related to loneliness, but not to depression. Potential mechanisms that link emotional loneliness with depression include personality traits, especially neuroticism (Hyland et al., 2018; Feenboom et al., 2015). Furthermore, we reported higher scores of emotional loneliness in participants with higher body mass index. Previous studies mainly reported on the association between loneliness and overweight or obesity rather than body mass index, however, results so far have been inconsistent (Hajek et al., 2021). Specifying results to social and emotional loneliness in future studies might shed more light on these associations.
Although we did not find significant evidence for differences by age group, some risk factors showed remarkably greater predictive power in specific age groups. For example, educational level was a significant protective factor for social loneliness particularly for the group aged 19-34. Also, being married was a protective factor over all ages but the impact seemed to increase by age. These age group differences could be explained by an age-normative perspective. This perspective assumes that the impact of a certain factor depends on what is the norm for your age (Luhmann & Hawkley, 2016; Parkhurst & Hopmeyer, 1997). This can be related to relational aspects (to what extent it is normative for your age to have certain intimate relationships or social networks), but also to socio-demographic factors (e.g., to what extent it is normative for your age to be single, live on your own or to have a (full-time) job) and health indicators (e.g., to what extent it is normative for your age to feel healthy, or to have a chronic disease or functional limitations) (Luhmann & Hawkley, 2016; Parkhurst & Hopmeyer, 1997). Our results are consistent with those of Luhmann & Hawkley, who concluded about the general construct of loneliness that risk factors such as work status and relationship status show different associations by age group (Luhmann & Hawkley, 2016). Our study adds to this knowledge in a unique way by showing the associations with subtypes of loneliness.

Our results provide further support for the conceptualization of social and emotional loneliness as related but different concepts. Although effect sizes of several risk factors were small, risk factors showed different and even opposite predictive power for social and emotional loneliness. The results of this study are important to consider when developing prevention and intervention strategies. Studies have shown that selection of participants is an important factor for effectiveness in loneliness interventions (Fokkema & van Tilburg, 2007; Masi et al., 2011). The current study suggests risk factors that can be used for selecting individuals more prone to a specific type of loneliness, e.g., male gender and lower educational level for social loneliness, and being unmarried/living alone or unemployment for emotional loneliness. Developing prevention and intervention strategies that appeal to individuals with similar backgrounds allows for more tailored interventions, which is another important factor for effectiveness in loneliness interventions (Bessaha et al., 2020; Fokkema & van Tilburg, 2007).

4.1. Strengths and limitations

This study, based on a large sample of 7,885 participants, is unique in describing specific risk factors of social and emotional loneliness. The use of structural equation modelling allowed for examination of social and emotional loneliness in a single model, thereby accurately accounting for the correlation between these constructs. The latter is impossible to do using traditional methods such as regression analysis, and therefore, structural equation modelling should be preferred.

However, the results should be interpreted taking several limitations into account. First, the cross-sectional design of the study implied that causal relationships could not be established. An implication of the cross-sectional design is that no distinction could be made between causal relationships could not be established. An implication of the social and emotional loneliness as related but different concepts. As it is important to focus on specific risk factors in the development of targeted prevention and intervention, effectiveness may be increased by taking into account risk factors for types of loneliness.

Ethical standards

The data were anonymized for analysis. The Medical Ethics Committee of the Academic Medical Center in Amsterdam was informed about the study protocol of the community-based health study and deemed that approval was not needed (GGD, CBS & RIVM, 2016).

CRediT authorship contribution statement

**Amy Hofman:** Conceptualization, Data curation, Formal analysis, Methodology, Software, Writing – original draft. **Regina I. Overberg:** Conceptualization, Data curation, Methodology, Supervision, Writing – review & editing. **Eric C. Schoenmakers:** Conceptualization, Methodology, Writing – review & editing. **Marco C. Adriaanse:** Conceptualization, Methodology, Supervision, Writing – review & editing.

Declaration of Competing Interests

None.

Supplementary materials


**References**


De Jong Gierveld, J., Kamphuis, F., 1985. The development of a Rasch-type loneliness


Dahlberg, L., McKee, K.J., 2014. Correlates of social and emotional loneliness in older


A. Hofman et al. 


Beutel, M.E., Klein, E.M., Braehler, E., Reiner, L., Junger, C., Michal, M., Wilkink, J.,


population: prevalence, determinants and relations to mental health. BMC Psychiatry

17 (1), 97. https://doi.org/10.1186/s12888-017-1268-z


10.1017/ipg.2014.10224799


Diehl, K., Jansen, C., Ischanov, K., Hilm, R., 2018. Loneliness at Universities:


