

Examining transitions in loneliness for people without and with moderate and severe disabilities

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Abstract:

Purpose: To investigate how disability affects the levels of loneliness reported by people living in Germany. In particular, we are interested in analysing the transitions into and out of loneliness but incorporating a dynamic approach of disability (i.e. disability trajectories).

Method: Drawing data from the German Socio-Economic Panel for the years 2013 and 2017 and using a three-item version of the UCLA Loneliness Scale, we construct a balance panel of individuals and estimate linear regression models on loneliness, and probit models to predict the likelihood to become lonely or exit from loneliness.

Results: We find a positive association between disability and loneliness (especially for those people who are severely limited). The frequency of contacts with family, friends, etc., the number of close friends and the participation in volunteering, sports, cultural and religious events reduce loneliness. Furthermore, we find that those individuals making the transition into a moderate/severe disability and also those recovering totally from a severe disability are more likely to become lonely in 2017.

Conclusions: From a public health policy perspective, it is necessary to undertake the design and implementation of instrumental, emotional and social support for people with disabilities. A higher engagement in social activities (e.g. social gatherings, cultural and leisure activities) and the elimination of barriers (e.g. structural and environmental) may become key elements to preventing loneliness.

Keywords: Loneliness; transitions; longitudinal data; Germany; disability

Introduction

Loneliness has emerged as an important social problem and one that has attracted the attention of many policy makers, governments, NGO's, employers and the general public in recent years [1-4]. According to Peplau & Perlman [4], loneliness is a perceived discrepancy between desired and actual quantity and quality of social relations. Loneliness is a subjective experience (not synonymous with objective social isolation), and is aversive (i.e. unpleasant and distressing) [5]. Loneliness affects individuals of all ages, those with poor health, the unemployed and those with low income rates [6-9]. According to the existing literature [10-18], people who are lonely are more likely to have mental problems, depression, hypertension, poor cognitive performance, worse sleep quality, and lower levels of subjective well-being. Furthermore, loneliness is not a static phenomenon but one that changes over time and which must be analysed and assessed from a longitudinal perspective [19-23]. However, the experience of loneliness can be different for some groups of people who traditionally experience higher levels of stigmatization, discrimination, marginalization and social exclusion, as for example people with disabilities [24-27]. For example, older people with cerebral palsy or a post-spinal cord injury/dysfunction experience more loneliness than older adults without disabilities [28,29].

The aim of this paper is to analyse the relationship between disability and the levels of loneliness reported by people without and with disabilities. We are particularly interested in examining how loneliness scores change over time according to the different patterns of disability. For this purpose, we have taken data from the German Socioeconomic Panel (SOEP) for the years 2013 and 2017 (in which our loneliness measure is only available) to investigate loneliness transitions of people with disabilities as compared to people without disabilities. However and different from other previous

studies on disability and loneliness, we adopt a dynamic approach of disability [30-32] wherein, instead of investigating the complexity of disability through a snapshot based on cross-sectional data, we use a balanced panel which allows us to identify the possible “*disability trajectories*” that individuals may follow over a 5-year period (from 2013 to 2017), as well as the variations in their loneliness scores. In this sense, Burchardt [30] concludes that those public policies that do not take into account these different disabilities trajectories that individuals may follow are unlikely to be successful. Additionally, we have estimated the odds of making a transition into (becoming lonely) and out (exiting from loneliness) of the state of loneliness in 2017. According to Hawkley and Kocherginsky [23], the factors predicting the reduction of loneliness are different from those that prevent the onset of or an increase in loneliness. Another important novelty of this study is the possibility to break down our sample of people with disabilities into two groups: those people who have a moderate disability and those with a severe disability that limits their daily activities.

Despite the existence of a wide array of previous studies on loneliness [4,9,20-23,33-39], the existing quantitative literature on disability and loneliness is very limited and based mainly on cross-sectional data. Nevertheless, it is worthwhile mentioning the works of Paul et al. [25], Korporaal et al. [26], Macdonald et al. [40] and Guilcher et al. [29]. According to Paul et al. [25], who performed a cross-sectional study of 999 people aged 65 or over, loneliness is the single most important predictor of psychological distress among people with disabilities. Korporaal et al. [26] analyse, using data from 710 men and 379 women of a Dutch community sample, the effects of own and spousal disability on social and emotional loneliness among married adults aged 65 and older. They find that own disability and spousal disability were related to higher levels of emotional loneliness among both men and women. Recently, Macdonald et al. [40] have examined

the relationship between disability, impairment, social isolation and emotional loneliness. From a sample consisting of 250 people with disabilities and 355 people without disabilities and offering a social model interpretation of their results, they found that people with disabilities, and in particular those with learning impairments, are at considerable risk of experiencing social isolation and feelings of emotional loneliness relative to people without disabilities. Finally, Guilcher et al. [29] investigate, using a telephone-based questionnaire administered to 170 community dwelling people who have a post-spinal cord injury/dysfunction, the relationship between social disconnectedness and social isolation. They find that factors associated with lower feelings of loneliness included being married, living with a higher proportion of network members, and being employed.

Within this context, the concept of social participation is a key factor to examine and understand the levels of loneliness experienced by people with disabilities, and has become one of the most relevant outcome in rehabilitation and social care [41,42]. However, authors such as Piškur et al. [43] point out that “a clear definition for participation or social participation does not yet exist. Definitions for social participation differ from each other and are not sufficiently distinct from the International Classification of Functioning, Disability and Health (ICF) definition of participation (pp. 211)”. According to the ICF [44], participation is defined as “is involvement in a life situation (pp. 10)”. In contrast, Piškur et al [43] conclude that “participation as defined by the ICF might inadequately capture the relevance of social activities or societal involvement (pp. 216)”. In the same line, the Disability Creation Process model [45,46] states that the main focus of social participation is on the interaction of individual factors with the physical and social environment.

The contribution of this study is two-fold. First, to our knowledge this is the first study to investigate transitions in loneliness adopting a dynamic approach of disability, and thus distinguishing the different disability trajectories that an individual may follow over a 5-year period along with their association with loneliness. Therefore, the present study fills an important gap in the existing literature on loneliness in general, and on disability in particular. We are aware that having only two years available (2013 and 2017) in the SOEP may limit the extent of this study, but our results may shed further light on the particular relationship between disability and loneliness, which can be analysed in more detail and depth as new waves of the SOEP are available in the near future. Second, this longitudinal study also allows us to distinguish people (with disabilities or not) who have a temporary or chronic loneliness, and thus design and implement specific public interventions and actions that contribute to preventing or combating states of loneliness and its chronification over time.

Data and methods

In this study we use data taken from the German Socio-Economic Panel (SOEP) for the years 2013 and 2017, the only ones in which loneliness was measured. This large panel data began in 1984 and includes information of German private households (around 30,000 respondents and 11,000 households are interviewed every year) on employment, income, education, health, satisfaction, social capital and living conditions, among others. Although we only include two years in our analysis (and similar to the works of Hawkey and Kocherginsky [23] for the United States, and Newall et al. [22] for Canada), the longitudinal nature of the SOEP allows us to look at loneliness and disability from a dynamic perspective, and contributes to detecting potential differences in the type of disability trajectory in terms of loneliness, and considering disability as a changing and non-permanent condition [30].

To measure loneliness, we have used a validated three-item version of the UCLA Loneliness Scale [47-49], which is based on the three following questions included in the SOEP for 2013 and 2017: a) *How often do you miss the company of other people?*; b) *How often do you feel left out?*, and; c) *How often do you feel socially isolated?* (Very often, often, sometimes, seldom and never). First, we have recoded the responses to each question using the following scale: 0 = never, 1 = seldom, 2 = sometimes, 3 = often, and 4 = very often. Second and in line with the previous literature [38], we have created a variable called “*loneliness*” that is the mean value of the responses to the three questions, and thus taking values from 0 (no loneliness) to 4 (high degree of loneliness). To estimate transitions in and out of loneliness (i.e. becoming lonely *versus* exit from loneliness), we have also created a dichotomous variable called “*lonely*” that takes a value of 1 if the individual is lonely, and zero otherwise. To be defined as “*lonely*”, we have imposed a frequency of the response “*sometimes*” for at least 2 items or “*often/very often*” for at least 1 item, as well as a cut-off point of at least 1.6 points in our continuous variable “*loneliness*”. These conditions are consistent with those used previously in the work of Hawkey and Kocherginsky [23].

To identify a person with disability we have used two questions included in the SOEP questionnaire for 2013 and 2017: “*Do you have a health problem that limits you in normal everyday life?* (Yes, severely/Yes, somewhat/No, not at all)”. Those persons who answer “*No, not at all*” are defined as people without disabilities, whereas those answering “*Yes*” are defined as people with disabilities. Persons responding “*Yes, severely*” or “*Yes, somewhat*” are also questioned: “*Have you had this health problem for more than half a year?* (Yes/No)”. Persons responding “*No*” are again considered as people without disabilities, whereas those answering “*Yes*” are defined as people with disabilities (but with different degrees of severity). According to Gannon [50], we are able to distinguish

two groups of people with disabilities: a) Those reporting a health problem for more than half a year that *severely* limits their normal daily activities; and b) those who report such a condition but state that it limits them but somewhat (i.e. *moderately*). As a result, we are considering three possible groups: a) People without disabilities; b) People with disabilities, who are *moderately* limited, and c) People with disabilities, who are *severely* limited. Although this disability measure is a self-evaluation and it does not refer to an “*objective*” definition of disability, the questions of the SOEP incorporate the main objective of the World Health Organization definition that relates disability to limitations on daily activities.

We only include in our sample those respondents aged 15 or over who are included in both waves (2013 and 2017), and with no missing information. Initially, we have used a balance panel consisting of a longitudinal sample of 14,359 individuals; that is, 28,718 person-wave observations. Furthermore, the transition analysis by disability and loneliness status included in the next descriptive section has been obtained using the sample weight available in the SOEP. In the econometric section, first we have run linear regression models on loneliness in 2017 using as regressors the individual’s loneliness scores in 2013 as well as a set of explanatory variables traditionally included in the existing literature which are *socioeconomic* (gender, age (and its square), years of education, real household income (in logarithms), having German nationality, and region of residence), *structural* (household size, number of children living in the household, employment status (full-time, part-time, and not working), relationship status (single, living with partner, and living without partner), relational time index (measuring the individual’s social capital and based on the frequency of contacts with family members, friends, neighbours, use of social online network, frequency of participation in volunteering, sports and cultural activities, and religious events), and number of close

friends as a quantitative measure of social contact), and *functional* (disability status/disability trajectories) characteristics/predictors. Finally, we have run probit regression models to predict the likelihood to become lonely and exit from loneliness in 2017, using regressors from 2013 (the same as those used in the previous linear regression model, except for the individual's loneliness scores in 2013). To carry out all these regressions and descriptive analysis, we have used the statistical package STATA 14.

Results

To start with, Table 1 shows the distribution of each disability trajectory (i.e. “without disabilities”, “moderate disability” and “severe disability”) between 2013 and 2017, as well as the mean levels of self-reported loneliness scores and sample sizes. Each row shows the percentage of individuals for a given disability status in 2013 found in a given disability status in 2017 (i.e. the row totals must equal 100). Looking at the matrix diagonal (shading), we find that the percentage of people without disabilities in 2013 who continue in the same disability status in 2017 is 95.72%, relatively higher than that for those people with disabilities who remain moderately or severely limited in 2013 and 2017 (69.93 and 82.93%, respectively). On average, 4.28% of people without disabilities in 2013 made the transition into disability in 2017 (2.6 and 1.68 % into moderate and severe disability, respectively). As for the mean loneliness scores, we find that these people without disabilities in 2013 becoming people with disabilities (moderately or severely) in 2017 report higher levels of loneliness (1.117 and 1.102 points, respectively) as compared to those who remain without disabilities in both years (0.982 points) and according to a test of means. As for people with a moderate disability in 2013, we find that 20.19% of them become people without disabilities and report lower levels of loneliness in 2017 (1.103 points) than those who still remain with a moderate disability (1.197 points) or have a severe disability (1.254 points) in 2017 (according to a test of

means, we also find differences between these two latter ones). Finally, for those people who had a severe disability in 2013, only 11.87% of them exit from disability in 2017, whereas 5.2% made the transition into a moderate disability. Once again, we find higher levels of loneliness for people with disabilities (1.294 and 1.310 points for moderate and severe disabilities, respectively) as compared to those reported by people without disabilities (1.126 points)

[Table 1]

Using our dichotomous variable “*lonely*” (=1 if the individual is lonely, and =0 otherwise), Table 2 presents the classification of all individuals into four different subgroups according to their loneliness status (Not lonely/Lonely) in 2013 and 2017. This classification allows us to distinguish, for example, those individuals making transition into and out of loneliness, or those who are persistently lonely [22]. Overall, we find a drop in the percentage of persons who were lonely in 2013 and 2017 (from 21.42 to 19.17%). We find that most people are located in the subgroup “*Not lonely* → *Not lonely*” (i.e. persistently not lonely), 69.74% of the total sample (10,013 individuals). 8.84% of the total sample are found in the subgroup “*Not lonely* → *Lonely*” (i.e. becoming lonely), whereas 11.09% of persons exit from loneliness (subgroup “*Lonely* → *Not lonely*”). The percentage of persons who are persistently lonely goes up to 10.33 of the total sample (1,483 individuals). Adding the percentages obtained for the subgroups “*Not lonely* → *Lonely*” (8.84%) and “*Lonely* → *Not lonely*” (11.09%), we can calculate the percentage of people experiencing transitory loneliness, i.e. 19.93%, higher than that found for the group “*Lonely* → *Lonely*” (i.e. persistently lonely, 10.33%).

[Table 2]

Despite the fact that Tables 1 and 2 take into account the different transitions in disability and loneliness status at two points in time (2013 and 2017), it is worthwhile combining both transition matrixes in order to identify differentiated associations of each disability trajectory with our loneliness transition matrix. Looking at Table 3, we find that the percentage of people who were lonely in 2013 compared to that observed in 2017 has considerably dropped for the disability trajectories “*Without disabilities*” to “*Moderate disability*” (from 28.46% to 18.80%), and “*Severe disability*” to “*Moderate disability*” from (52.63% to 13.16%, but the sample size is quite low, and this result must be taken with caution). For those people who are persistently lonely (“*Lonely* → *Lonely*”), overall we detect that the highest percentages are always found for those who have a severe disability in 2017 independently from their disabilities status in 2013. For example, for the disability trajectories “*Without disabilities* → *Severe disability*” and “*Moderate disability* → *Severe disability*” the percentages are 27 and 32.94%, respectively. For the trajectory “*Severe disability* → *Severe disability*” this percentage is even higher (34.84%). As for the entry rates into loneliness, we find that a total of 13.08% of persons who made the transition from “*Without disabilities*” to “*Severe disability*” become lonely in 2017, a percentage greater than those not being lonely in 2013 who transitioned into “*Moderate disability*” (9.14%) or remain “*Without disabilities*” (8.51%) in 2017. Similar results are found for those people who have moderate disabilities in 2013. However, it is worthwhile mentioning that 17.14% of persons located in the disability trajectory “*Severe disability* → *Without disabilities*” became lonely in 2017, a percentage even higher than that found in the trajectory “*Severe disability* → *Severe disability*” (11.09%). Finally, in general we find lower exit rates from loneliness for those persons making the transition into a severe disability in 2017 as compared to those located in other

disability statuses. This outcome may reflect that overcoming loneliness is quite difficult for those people who have a severe disability.

[Table 3]

Turning to the econometric results, Table 4 shows the coefficients and standard errors obtained from the estimation of our linear regression model on loneliness scores in 2017. It also includes the mean values and standard deviation of the explanatory variables used in the estimation process. We have run two different specifications, one using the individual's disability status (i.e. non-disabled, moderate disabled and severe disabled) in 2013, and the other taking into consideration the different disability trajectories that the individual may follow between 2013 and 2017. As we expected and consistent with the existing literature [22,23], we find that the coefficients on loneliness in 2013 in specifications 1 and 2 are positive (around 0.49 points) and strongly significant at conventional levels. Namely, having high loneliness scores in 2013 contributes to increasing the levels of loneliness in 2017 reported by all individuals. As for the variable "*disability status in 2013*" (specification 1), we find that people with moderate or severe disabilities in 2013 report higher levels of loneliness in 2017 than people without disabilities. In addition, we observe that the coefficient on "*Severe disability*" doubles the magnitude of the coefficient on "*Moderate disability*" (0.125 versus 0.063 points). This result is in line with that obtained in the previous descriptive analysis, and confirms the importance of controlling for the degree of disability in this type of studies on loneliness.

[Table 4]

As noted earlier, it is important to analyse and investigate "*disability*" from a dynamic perspective, bearing in mind the different trajectories that may be followed by individuals. In this sense, specification 2 includes a set of regressors identifying all

possible disability trajectories. First, the results clearly confirm the need and importance of distinguishing each disability trajectory in our regressions on loneliness in 2017. For those people without disabilities in 2013, we find that only those who became severely limited in 2017 increased their levels of loneliness in 2017 (0.172 points) with respect to the reference person (i.e. trajectory “*Without disabilities* → *Without disabilities*”). Furthermore, having a moderately limited disability in 2013 and 2017 increases the levels of loneliness in 2017 up to 0.0675 points with respect to the reference person. If the disability trajectory was from “*Moderate disability*” to “*Severe disability*” this increase in loneliness in 2017 would go up to 0.141 points (the coefficient is statistically significant at the 10% level) with respect to the disability trajectory “*Without disabilities* → *Without disabilities*”. Looking at people with severe disabilities in 2013, we find that the transition to “*Moderate disability*” in 2017 contributes to reducing their levels of loneliness in 2017 by 0.197 points (once again, the coefficient is only statistically significant at the 10% level) with respect to the reference person. On the contrary, those people with disabilities who remain severely limited in 2017 have higher levels of loneliness in 2017 (0.176 points). According to the mean values, this group of people with a severe disability in 2013 and 2017 represents 4.9% of the total sample, and similar to the people who remain in the disability status “*Moderate disability*” in both years (5.3%). However, the permanency in these disability trajectories (moderate *versus* severe) is quite different in terms of loneliness, being particularly burdensome for those people with severe disabilities in both years (0.0675 *versus* 0.176 points). From these findings, once again we may assert that disability becomes an important “*source*” and “*enhancer*” of loneliness, especially for those people with long-term severe disabilities.

As for the remaining explanatory variables included in the regressions, we find results similar to those found in the existing literature on loneliness [7,8,23,48,51]. For

example, males report lower levels of loneliness than females, whereas living without a partner in the household contributes to increasing the loneliness scores in 2017. We also find a U-shaped relationship between age and loneliness. Consistent with the previous literature, higher levels of household income and having German nationality are associated with lower levels of loneliness. In contrast, those people who are not working are more likely to report higher levels of loneliness than those who have a full-time job (reference category). As for the relational time index and the number of close friends, we find a negative relationship between these regressors and loneliness, i.e., those people with a greater number of close friends and more frequent contacts (e.g. with family members, friends, and neighbours) or a higher participation in activities such as volunteering, sports, and cultural and religious events are more likely to report lower levels of loneliness in 2017.

Finally, Table 5 displays the results obtained from the estimation of probit regression models to predict the likelihood to become lonely and exit from loneliness in 2017. Once again, we have run the same two specifications used previously in our linear regression model (with different disability measures) in order to detect the relationship and importance of each disability trajectory with our dependent variables. Apart from the coefficients, we have also calculated the marginal effects for each explanatory variable. As for the predictors of becoming lonely in 2017, we find in specification 1 that having a disability (especially if it is severe) increases the odds of becoming lonely in 2017 (4.81 and 8.65 percentage points for a moderate and severe disability, respectively). According to the results for specification 2 (now using disability trajectories), we find that the entry into disability (moderate or severe) from non-disability raises the probability of becoming lonely. For example, the transition from “*Without disabilities*” to “*Moderate disability*” increases this probability at 5.84 percentage points with respect to the baseline probability

(25.48 percentage points). For the trajectory “*Without disabilities* → *Severe disability*” the increase is even higher than before (8.67 percentage points). This outcome confirms again that the entry into disability leads to an increase in the loneliness scores reported by individuals.

[Table 5]

For those people with moderate disabilities in 2013, the permanency (having a moderate disability in both years) or worsening of their degree of disability (from moderate to severe disability) contributes to increasing the probability of becoming lonely in 2017 (4.92 and 12.62 percentage points, respectively). The higher the disability severity, the higher the loneliness scores. In the same line and observing the disability trajectories for those people who had a severe disability in 2013, we find that having a severe disability in both years increases the likelihood to become lonely in 2017 (9.31 percentage points). However, we find an interesting result: Those people recovering totally from a severe disability (i.e. “*Severe disability* → *Without disability*”) not only do not reduce their loneliness scores but rather they increase for them (at 11.75 percentage points). This finding may be explained by the fact that having a severe disability during a 5-year-period (at most) may have reduced (or even lose) the closeness and frequency of their contacts with other individuals (e.g. old friends, relatives, co-workers, etc.) or participation in other activities (e.g. sports, holiday trips, cultural events, etc.) during the disability and rehabilitation process. To shed further light on this issue and using the sample shown in Table 5 (for the regression “becoming lonely in 2017”), we have examined the marital and employment status, the RTI and the number of close friends for those individuals in the disability trajectory “*Severe disability* → *Without disability*” as compared to those in the reference trajectory “*Without disability* → *Without disability*”. We find that those individuals in the trajectory “*Severe disability* → *Without disability*”

are less likely than those in the trajectory “*Without disability* → *Without disability*” to be living with a partner in the household (60.49 *versus* 76.5%), have a full-time/part-time job (23.5 *versus* 56.6%), and higher number of close friends (3.77 *versus* 4.39) and RTI (1.14 *versus* 1.33). These differences between these two trajectories may explain in part the increase in loneliness reported by those people recovering totally from a severe disability (i.e. “*Severe disability* → *Without disability*”).

Oi [52] and Pagan [53] find that disability steals time (e.g. from work, social gatherings, and leisure) because persons with disabilities need more time to rest, obtain medical care, transportation, and accomplish everyday activities. This fact may lead to an important reduction in time available to maintain close friends, family members, co-workers or mates over time, thereby experiencing strong feelings of loneliness even after recovery from disability. According to the theory of “*Social Role Valorisation (SRV)*” developed by Wolfensberger [54-56] and considered as one of the theories with the greatest impact on public policy [57,58], people with disabilities need a valued social role within the community that contributes to improving public perceptions and social image of this collective, increasing their levels of life satisfaction, self-esteem, reputation, and personal competences [59]. The participation of people with disabilities in general and people who have exit from disability in particular in social programs (e.g. employment, volunteering, housing, sports, and training) may create and enhance their valued social roles that reduce the levels of loneliness reported by these individuals. For example, Aubry et al. [60] find, using a sample of persons with psychiatric disabilities, that the promotion of SRV values through the functional features of housing environments and their associated services increases their life satisfaction scores because of higher levels of psychological integration. Finally, Connaughton and Cline [61] point out that “action is

also necessary at the level of society to ensure that the rights of people with disabilities to be included in society and to enjoy “*the good things of life*” are respected (pp. 7)”.

With regard to exiting from loneliness, in specification 1 we do not find any significant coefficient on disability status in 2013. In contrast, in specification 2 we detect that those persons located in the disability trajectories “*Severe disability → Without disabilities*” and “*Severe disability → Moderate disability*” are more likely to overcome loneliness (19.75 and 25.35 percentage points, respectively) than those in the reference trajectory (“*Without disabilities → Without disabilities*”). In contrast, having a disability trajectory “*Moderate disability → Severe disability*” or “*Severe disability → Severe disability*” contributes to reducing the likelihood to exit from loneliness in 2017 (23.83 and 6.65% respectively). Overall and once again, these findings confirm the importance and need to take into consideration the possible disability trajectories that people may follow and their relationship with loneliness in general, and transitions in and out of loneliness in particular.

Conclusions

Using data from the SOEP for the years 2013 and 2017, we have examined the relationship between disability and loneliness among persons living in Germany. As noted earlier, an important innovation in this study as compared to other previous studies on loneliness has been to consider disability as a dynamic process wherein different possible disability trajectories have been incorporated in our analysis. For this purpose, we have analysed not only these disabilities trajectories but also the transitions in loneliness, as well as the combination of both transition matrixes. Overall, we find that disability plays a key role in explaining the levels of loneliness reported by individuals. Our results show that people with severe disabilities report the highest levels of loneliness, especially if this disability status remains over time. The permanency in a

moderate disability between 2013 and 2017 is also painful in terms of loneliness but much lower than that found for long-term severe disabilities (6.75 versus 17.6 points, respectively). The odds of becoming lonely in 2017 are particularly high for those making the transition into severe disability, and even for those recovering totally from a severe disability to a non-disabled status. The exit from loneliness is significantly lower for those people with disabilities who remain severely limited or make a transition from a moderate to a severe disability as compared to those without disabilities in both years.

From a public policy perspective, our results have identified a set of strong and significant predictors that may help reduce the levels of loneliness reported by all individuals as well as their likelihood to become lonely. Apart from disability status or disability trajectory (as *functional* factors), our estimates have shown that *structural* factors such as household income, frequency of contacts with family, friends, etc. and participation in volunteering, sports, cultural and religious events (measured by the aggregate variable “*relational time index*”), and number of close friends have a significant negative association with loneliness. For example, we have found a significant and negative household income-loneliness relationship, even after controlling for employment status, “*relational time index*” and number of close friends (specification 2 in Table 4). There is also a solid empirical evidence that finds a significant negative relationship between disability and household income, and for most of the types of impairments/disabilities [64-64]. As a result, people with disabilities living in households with low income levels are more likely to experience higher levels of loneliness than people without disabilities living in households with low income. Income becomes a key risk factor for loneliness [8], and the access to economic support (e.g. social protection programmes and income transfers) is highly recommended and demanded, especially by middle-aged and older adults with disabilities, in order to protect minimum living

standards and develop stronger livelihoods and more equitable societies [65-67]. Recently, Hawkey et al. [68] have also analysed the effect of financial losses (e.g. Great Recession of 2008-2010) on loneliness in American older adults, and have concluded that “targeting older adults' financial difficulties could directly or indirectly help to reduce loneliness in this vulnerable population (pp. 8)”. In this vein, the introduction of a specific financial assistance for people with disabilities (e.g. adequate funding for social care and employment, better access to welfare benefits and public health services, grants and tax credits) may become a relevant and effective instrument to reduce their loneliness scores. We have also found how the participation in volunteering, sports, cultural and religious events reduces loneliness. Pagan [69] finds that the levels of participation in all leisure activities, with the exception of “attending church”, are lower for people with disabilities (especially if the individual has a severe disability) as compared to people without disabilities. He also finds that “meeting family and friends”, “doing sports” and “cultural events” are significant contributors to reducing the levels of loneliness reported by people with severe disability. In addition, Junhyoung et al. [70] find that the participation in cultural and volunteer activities increases life satisfaction, social support and health perception among individuals who have physical disabilities.

According to the existing literature [19,71,72], people with disabilities are more likely to suffer from loneliness because of loss of friends and relatives, lower income levels and social networks, mobility restrictions, the existence of discriminatory practices, and the lack of inclusive community environments. Moreover, the perception of friendship and the skills for making and maintaining friends may be different for people with disabilities as a result of different social experiences and expectations [73]. Accordingly, this can become a significant barrier to inclusion as people with disabilities begin to spend time in inclusive community environments [74]. In many cases, people

with disabilities often interact with other peers with disabilities, family members and people who are paid to interact with them (caregivers, rehabilitation professionals, etc.), and have fewer relationships with people without disabilities [75].

Within this context, it is necessary to design and implement specific public interventions and strategies to enhance participation of people with disabilities in society in order to increase their interpersonal relationships, social gatherings, personal identity, independency, confidence, self-esteem, social participation and well-being [76]. For example, Cicerone [77] points out that after having a traumatic brain injury (TBI) one of the main goals of rehabilitation must be to enhance social participation, community integration and quality of life, even though it is difficult to eliminate specific neurological, cognitive, or functional impairments. Furthermore, individuals' preferences and values must be taken into account to avoid the loss of contacts after rehabilitation, and thus the increase in their levels of loneliness [77]. According to Olkin and Howson [78], the social construction of disability is the basis for a lack of social acceptance and inclusion of people with disabilities into society. Macdonald et al. [79] find, using data from a sample of 250 and 355 people with and without disabilities in the UK respectively, that around "74% of people with disabilities who experienced loneliness and social isolation reported that disabling barriers impacted on their accessing leisure activities outside the home (pp. 1157)". In addition, Wormald et al. [80] point out that older people with an intellectual disability tend to lead less independent lives (relying on service providers), experience more emotional health problems, and are more affected by changes in service provision which enhances their loneliness scores. Following McVilly et al. [81], the existence of functional limitations also affect the levels of education and employment status that a person has. In our case, we find a negative relationship between being out of the labour market and the likelihood to exit from loneliness in 2017 (Table 5). Therefore, having a

job (full or part-time) within the community becomes a good protector and contributor to reducing loneliness. Recently, Morris [82] has also found that addressing loneliness among older European adults could mitigate the risk of depression and, in turn, work disability onset.

Community programs, behavioural interventions, the commitment of the medical community (e.g. rehabilitation professionals), as well as online support are all useful tools to combat the problem of loneliness among people with disabilities [3,29]. However, in many cases, some sport, cultural and other leisure activities that greatly contribute to reducing loneliness are less accessible to people with disabilities. This lack of accessibility and accommodation limits in many cases the full participation of people with disabilities (especially those who are severely limited) in these type of events and their corresponding positive effects on preventing and combatting loneliness. In addition, Pagan [83] finds that the participation of people with disabilities in social networks is still low as compared to people without disabilities, and demonstrates how relational goods (defined by Gui [84] as “*non-material goods, which are not services that are consumed individually, but are tied to interpersonal relations*”) have a positive impact on all individuals’ life satisfaction scores, which is even stronger for people with disabilities. However, preventing and combatting loneliness is not only the responsibility of public services, policy makers and governments; family members play an important role in demanding more help from professionals and community members to enhance friendships and social inclusion for people with disabilities within society [65].

Despite controlling for the degree of severity of disability, a limitation of this study is the lack of information in the SOEP on the types of disability that individuals have. The relationship between disability and loneliness from a dynamic point of view are expected to be different according to the type of disability, finding, for example, the

highest levels of loneliness for those people with mental health problems. Only new datasets with this kind of information on the type of disability can allow us to carry out more detailed and disaggregated studies on loneliness in the future. As noted earlier, we only use two years in this study, and this fact limits the possibility to investigate longer and different disability trajectories (e.g. being a person with a disability during two or three years but intermittently (or consecutively), and being a person with a disability all years) and to follow up on the individuals during additional years.

Declaration of interest

The authors report no conflicts of interest.

References

- [1] Murthy V. Work and the loneliness epidemic. *Harvard Business Review* (Brighton); 2017 (Sept 28).
- [2] D'Hombres B, Sylke S, Barjakova M, Mendonca F. Loneliness-an unequally shared burden in Europe. Technical Report European Commission; 2018.
- [3] Cacioppo J, Cacioppo S. The growing problem of loneliness. *The Lancet*. 2018;391: 426-426.
- [4] Peplau, L, Perlman D. *Loneliness: A sourcebook of current theory, research, and therapy*. New York: Wiley: 1982.
- [5] Perlman D, Peplau L. Loneliness research: A survey of empirical findings. In L. Peplau & S. Goldston (Eds.), *Preventing the harmful consequences of severe and persistent loneliness*;1984:13-46. Rockville (Maryland): US Government Print Office.
- [6] Yang K, Victor C. Age and loneliness in 25 European nations. *Ageing & Society*. 2011;31:368-1388.

- [7] Nicolaisen M, Thorsen K. Who are lonely? Loneliness in different age groups (18-81 years old), using two measures of loneliness. *The International Journal of Aging and Human Development*. 2014;78(3): 229-257.
- [8] Luhmann M, Hawkley L. Age differences in loneliness from late adolescence to oldest old age. *Developmental Psychology*. 2016;52(6): 943-959.
- [9] Pikhartova J, Bowling A, Victor C. Is loneliness in later life a self-fulfilling prophecy? *Aging & Mental Health*. 2016;20(5):543-549.
- [10] Hawkley L, Burleson M, Berntson G, Cacioppo J. Loneliness in everyday life: Cardiovascular activity, psychosocial context, and health behaviors. *Journal of Personality and Social Psychology*. 2003;85(1):105-120.
- [11] Hawkley L, Thisted R, Masi C, Cacioppo J. Loneliness predicts increased blood pressure: 5-year cross-lagged analyses in middle-aged and older adults. *Psychology and Aging*. 2010;25(1):132-141.
- [12] Wilson R, Krueger K, Arnold S, Schneider J, Kelly J, Barnes, L, Bennett D. Loneliness and risk of Alzheimer disease. *Archives of General Psychiatry*. 2007;64(2): 234-240.
- [13] Cacioppo J, Hawkley L, Thisted R. Perceived social isolation makes me sad: 5-year cross-lagged analyses of loneliness and depressive symptomatology in the Chicago Health, Aging, and Social Relations Study. *Psychology and Aging*. 2010;25(2):2010, 453-463.
- [14] Luo Y, Hawkley L, Waite L, Cacioppo J. Loneliness, health, and mortality in old age: A national longitudinal study. *Social Science & Medicine*. 2012;74(6):907-914.
- [15] Saygin Y, Akdeniz S, Deniz M. Loneliness and interpersonal problem solving as predictors of subjective wellbeing. *International Journal of Information and Education Technology*. 2015;5(1):32-35.

- [16] Valtorta N, Kanaan M, Gilbody S, Ronzi S, Hanratty B. Loneliness and social isolation as risk factors for coronary heart disease and stroke: Systematic review and meta-analysis of longitudinal observational studies. *Heart*. 2016;102(13):1009-1016.
- [17] Ong A, Uchino B, Wethington E. Loneliness and health in older adults: a mini-review and synthesis. *Gerontology*. 2016;62:443-449.
- [18] Hawkley L. Social isolation, loneliness and health. In Lobel, J., and Scharff, P. (Eds). *Solitary confinement. Effect, practices and pathways toward reform*. Oxford University Press: Oxford;2019:185-198.
- [19] Jylhä M. (Old age and loneliness: Cross-sectional and longitudinal analyses in the Tampere Longitudinal Aging Study. *Canadian Journal on Aging*. 2004;23:157-168.
- [20] Cohen-Mansfield J, Shmotkin D, Goldberg S. Loneliness in old age: Longitudinal changes and their determinants in an Israeli sample. *International Psychogeriatrics*. 2009;21:1160-1170.
- [21] Victor C, Scambler S, Bowling A, Bond J. The prevalence of, and risk factors for, loneliness in later life: A survey of older people in Great Britain. *Ageing and Society*. 2005;25:357-375.
- [22] Newall N, Chipperfield J, Bailis D. Predicting stability and change in loneliness in later life. *Journal of Social and Personal Relationships*. 2014;31:335-351.
- [23] Hawkley L, Kocherginsky M. Transitions in loneliness among older adults: a 5-year follow-up in the national social life, health, and aging project. *Research on aging*. 2018;40(4):365-387.
- [24] Dykstra P, Van Tilburg T, De Jong J. Changes in older adult loneliness: Results from a seven-year longitudinal study. *Research on Aging*. 2005; 27:725-747.
- [25] Paul C, Ayis S, Ebrahim S. Psychological distress, loneliness and disability in old age. *Psychology, Health & Medicine*. 2006;11(2):221-232.

- [26] Korporaal M, Broese van Groenou, M, van Tilburg T. Effects of own and spousal disability on loneliness among older adults. *Journal of Aging and Health*. 2008;20(3): 306-325.
- [27] Morris Z. Loneliness as a predictor of work disability onset among nondisabled, working older adults in 14 countries. *Journal of Aging and Health*. 2019;online first. DOI: 10.1177/0898264319836549.
- [28] Balandi S, Berg N, Waller A. Assessing the loneliness of older people with cerebral palsy. *Disability and Rehabilitation*. 2009;28(8):469-479.
- [29] Guilcher S, Craven C, Basset-Gunter R, Cimino S, Hitzig S. An examination of objective social disconnectedness and perceived social isolation among persons with spinal cord injury/dysfunction: a descriptive cross-sectional study. *Disability & Rehabilitation*. 2019;online first. DOI: 10.1080/09638288.2019.1616328.
- [30] Burchardt T. The dynamics of being disabled. *Journal of Social Policy*. 2000; 29:645-68.
- [31] Pagan R. Dynamic analysis of disability in Spain using the European Community Household Panel. *Estudios de Economía Aplicada*. 2007;25(2):499-522.
- [32] Jones M, Davies R, Drinkwater S. The dynamics of disability and work in Britain. *The Manchester School*. 2016;86(3):279-307.
- [33] Wenger G, Burholt V. Changes in levels of social isolation and loneliness among older people in a rural area: A twenty-year longitudinal study. *Canadian Journal on Aging*. 2004;23:115-127.
- [34] Hawkey L, Hughes M, Waite L, Masi C, Thisted R, Cacioppo J. From social structural factors to perceptions of relationship quality and loneliness: The Chicago health, aging, and social relations study. *Journal of Gerontology, Social Sciences*. 2008;63B: S375-S384.

- [35] Hawkey L, Cacioppo J. Loneliness matters: A theoretical and empirical review of consequences and mechanisms. *Annals of Behavioral Medicine*. 2010;40:218-227.
- [36] Victor C, Bowling A. A longitudinal analysis of loneliness among older people in Great Britain. *The Journal of Psychology*. 2012;146:313-331.
- [37] Holt-Lunstad J, Smith T, Baker M, Harris T, Stephenson D. Loneliness and social isolation as risk factors for mortality: A meta-analytic review. *Perspectives on Psychological Science*. 2015;10:227-237.
- [38] Luhmann M, Hawkey L. Age differences in loneliness from late adolescence to oldest old age. *Developmental Psychology*. 2016;52(6):943-959.
- [39] Nyqvist F, Nygard M, Scharf T. Loneliness amongst older people in Europe: a comparative study of welfare regimes. *European Journal of Ageing*. 2019;16:133-143.
- [40] Macdonald S, Deacon L, Nixon J, Akintola A, Gillingham A, Kent J, Ellis G, Mathews D, Ismail A, Sullivan S, Dore S, Highmore L. The invisible enemy: disability, loneliness and isolation. *Disability & Society*. 2018;33(7):1138-1159.
- [41] Law M. Participation in the occupations of everyday life. *American Journal of Occupational Therapy*. 2002;56(6):640-649.
- [42] Hemmingsson H, Jonsson H. An occupational perspective on the concept of participation in the International Classification of Functioning, Disability and Health—some critical remarks. *American Journal of Occupational Therapy*. 2005;59(5):569-576.
- [43] Piškur B, Daniëls R, Jongmans M, Ketelaar M, Smeets R, Norton M, Beurskens A. (2014). Participation and social participation: are they distinct concepts? *Clinical Rehabilitation*. 2014;28(3):211-220.
- [44] World Health Organization. International classification of functioning, disability and health. 2001. Geneva, Switzerland: WHO.

- [45] Fougeyrollas P, Noreau L, Bergeron H, Cloutier R, Dion S, St-Michel G. Social consequences of long term impairments and disabilities: conceptual approach and assessment of handicap. *International Journal of Rehabilitation Research* 1998;21(2):127-141.
- [46] Fougeyrollas P, Boucher N, Edwards G, Grenier Y, Noreau, L. 2019. The Disability Creation Process Model: A Comprehensive Explanation of Disabling Situations as a Guide to Developing Policy and Service Programs. *Scandinavian Journal of Disability Research*. 2019;21(1):25-37.
- [47] Russell D. UCLA loneliness Scale (Version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment*. 1996;66(1): 20-40.
- [48] Hughes M, Waite L, Hawkey L, Cacioppo J. A short scale for measuring loneliness in large surveys: Results from two population-based studies. *Research on Aging*. 2004;26: 655-672.
- [49] Hawkey L, Duvoisin R, Ackva J, Murdoch J, Luhmann M. Loneliness in older adults in the USA and Germany: Measurement invariance and validation. Working Paper Series, NORC at the University of Chicago;2015:Paper 2015-002.
- [50] Gannon B. A dynamic analysis of disability and labour force participation in Ireland 1995-2000. *Health Economics*. 2005;4(9): 925-938.
- [51] Pinquart M, Sörensen S. Influences on loneliness in older adults: A meta-analysis. *Basic and Applied Social Psychology*. 2001;23:245-266.
- [52] Oi W. Disability and a workfare-welfare dilemma. In Weaver, C. (Ed.), *Disability and work*. Washington: AEI Press;1991.
- [53] Pagan R. Time allocation of disabled individuals. *Social Science & Medicine*. 2013;84:80-93.

- [54] Wolfensberger W. Social role valorization: A proposed new term for the principle of normalization. *Mental Retardation*. 1985;31:234-238.
- [55] Wolfensberger W. A brief introduction to social role valorisation as a high order concept for addressing the plight of societally devalued people, and for structuring human services (3rd ed., rev.). Syracuse, NY: Syracuse University. Training Institute for Human Service Planning, Leadership and Change Agency. 1998.
- [56] Wolfensberger W. A brief overview of social role valorization. *Mental Retardation*. 2000;38:105-123.
- [57] Ferretti R, Eisenman E. Commentary: Delivering educational services that meet the needs of all students. *Exceptional Children*. 2010;76(3):378-383.
- [58] Mann G, van Kraayenoord C. The influence of Wolf Wolfensberger and his ideas. *International Journal of Disability, Development and Education*. 2011;58(3):203-211.
- [59] Wolfensberger W, Thomas S. The principle of normalization in human services: A brief overview. In *Research Highlights*. Aberdeen, Scotland: University of Aberdeen, Department of Social Work. 1981;2.
- [60] Aubry T, Flynn R, Virley B, Neri J. Social role valorization in community mental health housing: does it contribute to the community integration and life satisfaction of people with psychiatric disabilities? *Journal of Community Psychology*. 2013;41(2):218-235.
- [61] Connaughton H, Cline T. How far can social role valorisation theory help in transition planning for a school-leaver with significant special needs? *British Journal of Learning Disabilities*. 2020;00:1-7.
- [62] Elwan A. Poverty and disability: A survey of the literature: Social Protection Advisory Service. 1999.

- [63] Mitra S, Posarac A, Vick B. Disability and poverty in developing countries: a multidimensional study. *World Development*. 2013;41:1-18.
- [64] Banks L, Kuper H, Polack S. Poverty and disability in low- and middle-income countries: A systematic review. *PLOS ONE*. 2018;13(9): e0204881.
- [65] Ellis F, White P, Lloyd-Sherlock P, Chhotray V, Seeley J. Social protection research scoping study. East Anglia: Governance and Social Development Resource Centre. 2008.
- [66] Gentilini U, Omamo, S. Social protection 2.0: Exploring issues, evidence and debates in a globalizing world. *Food Policy*. 2011;36:329-340.
- [67] Banks L, Mearkle R, Mactaggart I, Walsham M, Kuper H, Blanchet K. Disability and social protection programmes in low- and middle-income countries: a systematic review, *Oxford Development Studies*. 2017;45(3):223-239.
- [68] Hawkey L, Zheng B, Song X. Negative financial shock increases loneliness in older adults, 2006–2016: Reduced effect during the Great Recession (2008–2010). *Social Science and Medicine*. 2020. <https://doi.org/10.1016/j.socscimed.2020.113000>.
- [69] Pagan R. Leisure activities and loneliness among people with disabilities”, in A. Lubowiecki-Vikuk, B. Barbosa de Sousa, B. Derčan & W. Leal-Filho (eds.), *Handbook of Sustainable Development and Leisure Services*. 2020 (forthcoming). Springer, World Sustainability Series. ISBN 978-3-030-59819-8.
- [70] Junhyoung K, May K, Areum Ham (2018). Exploring the Relationship between Types of Leisure Activities and Life Satisfaction, Health Perception, and Social Support among Korean Individuals with Physical Disabilities. *American Journal of Health Behavior*. 2018;42(4):34-44.

- [71] Dykstra P, Van Tilburg T, De Jong J. Gender and marital-history differences in emotional and social loneliness among Dutch older adults. *Canadian Journal on Aging / La Revue Canadienne du Vieillissement*. 2004;23:141-155.
- [72] Savikko N, Routasalo P, Tilvis R, Strandberg T, Pitkälä K. Predictors and subjective causes of loneliness in an aged population. *Archives of Gerontology and Geriatrics*. 2005;41:223-233.
- [73] Stainback W, Stainback S. Facilitating friendships. *Education & Training in Mental Retardation*. 1987;22(1):18-25.
- [74] Schleien S, Green F, Stone C. Making friends within inclusive community recreation programs. *American Journal of Recreation Therapy*. 2003;2(1):7-16.
- [75] Amado A. Friendships and community connections between people with and without developmental disabilities. Baltimore: Paul H. Brookes, 1993.
- [76] McLean A, Jarus T, Hubley A, Jongbloed L. Associations between social participation and subjective quality of life for adults with moderate to severe traumatic brain injury. *Disability & Rehabilitation*. 2013;36(17):1409-1418.
- [77] Cicerone, K. Participation as an Outcome of Traumatic Brain Injury Rehabilitation. *Journal of Head Trauma Rehabilitation*. 2004;19(6):494-501.
- [78] Olkin R, Howson L. Attitudes toward and images of physical disability. *Journal of Social Behavior and Personality*. 1994;9(5):81-96.
- [79] Macdonald J, Deacon L, Nixon J, Akintola A, Gillingham A, Kent J, Ellis G, Mathews D, Ismail A, Sullivan S, Dore S, Highmore L. The invisible enemy: disability, loneliness and isolation. *Disability & Society*. 2018;33(7):1138-1159.
- [80] Wormald A, McCallion P, McCarron M. The antecedents of loneliness in older people with an intellectual disability. *Research in Developmental Disabilities*. 2019;85:116-130.

- [81] McVilly K, Stancliffe R, Parmenter T, Burton-Smith R. 'I Get by with a Little Help from my Friends': Adults with Intellectual Disability Discuss Loneliness. *Journal of Applied Research in Intellectual Disabilities*. 2006;19(2):191-203.
- [82] Morris Z. (2020). Loneliness as a predictor of work disability onset among nondisabled, working older adults in 14 countries. *Journal of Aging and Health*. 2020. Online first. <https://doi.org/10.1177/0898264319836549>.
- [83] Pagan R. Are relational goods important for people with disabilities?, *Applied Research in Quality of Life*. 2016;11(7):1117-1135.
- [84] Gui B. Éléments pour une Définition d' Economie Communautaire, Notes et Documents de l'Institut International Jacques Maritain Rome, Institut Internationale Jacques Maritain.1987;19/20:32-42.

Table 1. Disability transition matrix (percentage distribution in row) and mean R-UCLA self-reported loneliness scores (i.e. 0 = never, 1 = seldom, 2 = sometimes, 3 = often, and 4 = very often) in Germany (2013 *versus* 2017).

Disability status in 2013	Disability status in 2017				
	Without disabilities	Moderate disability	Severe disability	TOTAL	Sample
Without disabilities	95.72% <i>0.982</i>	2.60% <i>1.117^a</i>	1.68% <i>1.102^a</i>	100% <i>0.988</i>	12,648
Moderate disability	20.19% <i>1.103</i>	69.93% <i>1.197^a</i>	9.89% <i>1.254^{a,b}</i>	100% <i>1.185</i>	961
Severe disability	11.87% <i>1.126</i>	5.20% <i>1.294^a</i>	82.93% <i>1.310^a</i>	100% <i>1.295</i>	750
TOTAL	86.29% <i>0.985</i>	7.24% <i>1.158^a</i>	6.47% <i>1.261^{a,b}</i>	100% <i>1.023</i>	14,359

Note: Sample consists of individuals aged 15 or over in 2013. Weighted data. ^a Difference between without and with disabilities (moderate and severe) is significant at P<0.05. ^b Difference between moderate and severe disability is significant at P<0.05. Source: Author's calculations using SOEP (2013 and 2017).

Table 2. Loneliness transition matrix (percentage over the total sample, and sample size between brackets) in Germany (2013 *versus* 2017).

Loneliness status in 2013	Loneliness status in 2017		
	Not lonely	Lonely	TOTAL
Not lonely	69.74% (10,013)	8.84% (1,270)	78.58% (11,283)
Lonely	11.09% (1,593)	10.33% (1,483)	21.42% (3,076)
TOTAL	80.83% (11,606)	19.17% (2,753)	100% (14,359)

Note: Sample consists of individuals aged 15 or over in 2013. Weighted data. Source: Author's calculations using SOEP (2013 and 2017).

Table 3. Disability transition matrix (percentage over each subtotal, and sample size between brackets) by loneliness status (not lonely *versus* lonely) in Germany (2013 *versus* 2017).

Disability and loneliness status in 2013	Disability and loneliness status in 2017								
	Without disabilities			Moderate disability			Severe disability		
	Not lonely	Lonely	SUBTOTAL	Not lonely	Lonely	SUBTOTAL	Not lonely	Lonely	SUBTOTAL
Without disabilities									
Not lonely	71.77% (8,632)	8.51% (1,024)	80.29% (9,656)	62.40% (239)	9.14% (35)	71.54% (274)	59.92% (142)	13.08% (31)	73.00% (173)
Lonely	10.39% (1,250)	9.32% (1,121)	19.71% (2,371)	18.80% (72)	9.66% (37)	28.46% (109)	11.81% (28)	15.19% (36)	27.00% (64)
SUBTOTAL	82.17% (9,882)	17.83% (2,145)	100% (12,027)	81.20% (311)	18.80% (72)	100% (383)	71.73% (170)	28.27% (67)	100% (237)
Moderate disability									
Not lonely	71.26% (124)	9.77% (17)	81.03% (141)	61.48% (431)	9.70% (68)	71.18% (499)	56.47% (48)	10.59% (9)	67.06% (57)
Lonely	10.34% (18)	8.62% (15)	18.97% (33)	13.41% (94)	15.41% (108)	28.82% (202)	8.24% (7)	24.71% (21)	32.94% (28)
SUBTOTAL	81.61% (142)	18.39% (32)	100% (174)	74.89% (525)	25.11% (176)	100% (701)	64.71% (55)	35.29% (30)	100% (85)
Severe disability									
Not lonely	48.57% (34)	17.14% (12)	65.71% (46)	44.74% (17)	2.63% (1)	47.37% (18)	54.06% (346)	11.09% (71)	65.16% (417)
Lonely	21.43% (15)	12.86% (9)	34.29% (24)	42.11% (16)	10.53% (4)	52.63% (20)	14.22% (91)	20.63% (132)	34.84% (223)
SUBTOTAL	70.00% (49)	30.00% (21)	100% (70)	86.84% (33)	13.16% (5)	100% (38)	68.28% (437)	31.72% (203)	100% (640)

Note: Sample consists of individuals aged 15 or over in 2013. Weighted data. Total number of observations: 14,359. Source: Author's calculations using SOEP (2013 and 2017).

Table 4. Linear regressions (OLS) on loneliness in 2017 in Germany.

	<i>Mean (SD)</i>	<i>Specification 1</i>	<i>Specification 2</i>
Loneliness in 2013	0.984 (0.727)	0.491*** (0.0101)	0.489*** (0.0101)
Disability status in 2013:			
Without disabilities (WD) (<i>reference</i>)	0.866	-	
Moderate disability (MD)	0.075	0.0630*** (0.0224)	
Severe disability (SD)	0.059	0.125*** (0.0300)	
Disability trajectories 2013 → 2017:			
Without disabilities → Without disabilities (<i>reference</i>)	0.824		-
Without disabilities → Moderate disability	0.026		0.0494 (0.0408)
Without disabilities → Severe disability	0.016		0.172*** (0.0581)
Moderate disability → Without disabilities	0.015		0.0462 (0.0468)
Moderate disability → Moderate disability	0.053		0.0675*** (0.0261)
Moderate disability → Severe disability	0.007		0.141* (0.0722)
Severe disability → Without disabilities	0.007		-0.0100 (0.0813)
Severe disability → Moderate disability	0.003		-0.197* (0.105)
Severe disability → Severe disability	0.049		0.176*** (0.0329)
Male	0.465 (0.499)	-0.0392*** (0.0123)	-0.0403*** (0.0123)
Age	53.604 (15.947)	-0.00665** (0.00267)	-0.00690*** (0.00266)
Age ² /1000	3.128 (1.690)	0.0545** (0.0264)	0.0555** (0.0262)
Marital status:			
Single	0.110	0.0224 (0.0220)	0.0211 (0.0220)
Living without partner	0.147	0.0374* (0.0204)	0.0383* (0.0203)
Living with partner (<i>reference</i>)	0.743	-	-
Household size	2.432 (1.158)	0.0109 (0.00877)	0.0107 (0.00874)
Number of children in household	0.390 (0.789)	-0.0191 (0.0118)	-0.0186 (0.0118)
Years of education	12.561 (2.760)	-0.00346 (0.00224)	-0.00324 (0.00224)
German	0.964	-0.112*** (0.0347)	-0.115*** (0.0345)
Log (real household income)	5.411 (0.539)	-0.0438*** (0.0137)	-0.0425*** (0.0137)
Employment status:			
Full-time (<i>reference</i>)	0.382	-	-
Part-time	0.135	-0.00528 (0.0183)	-0.00647 (0.0183)

Non-working	0.484	0.0290*	0.0273*
		(0.0166)	(0.0166)
Relational Time Index (RTI)	1.295	-0.0339***	-0.0325**
	(0.496)	(0.0128)	(0.0128)
Number of close friends	4.287	-0.00440***	-0.00429***
	(3.645)	(0.00166)	(0.00166)
Regional dummies		<i>Yes</i>	<i>Yes</i>
<i>Constant</i>	-	1.103***	1.101***
		(0.107)	(0.107)
Number observations		11,996	11,996
R-squared		0.282	0.284

Note: Robust standard errors in parentheses, stars for significance levels. Individuals aged 15 or over: ***p < 0.01, **p < 0.05, *p < 0.1. Source: Author's calculations using the German Socio-Economic Panel (SOEP) for the years 2013 and 2017.

Table 5. Determinants of becoming lonely (“*Not lonely* → *Lonely*”) and exit from loneliness (“*Lonely* → *Not lonely*”) in 2017 (coefficients and marginal effects (ME) from a probit regression model) in Germany.

	BECOMING LONELY IN 2017				EXIT FROM LONELINESS IN 2017					
	Mean (SD)	Specification 1		Specification 2		Mean (SD)	Specification 1		Specification 2	
		Coeff.	ME	Coeff.	ME		Coeff.	ME	Coeff.	ME
Disability status in 2013:										
Without disabilities (WD) (<i>reference</i>)	0.882	-				0.803	-			
Moderate disability (MD)	0.069	0.149** (0.0672)	0.0481			0.098	-0.0875 (0.0887)	-0.0349		
Severe disability (SD)	0.049	0.268*** (0.0746)	0.0865			0.099	-0.0437 (0.0902)	-0.0174		
Disability trajectories 2013 → 2017:										
Without disabilities → Without disabilities (<i>reference</i>)	0.844			-		0.749			-	
Without disabilities → Moderate disability	0.024			0.182* (0.107)	0.0584	0.032			0.0632 (0.144)	0.0252
Without disabilities → Severe disability	0.015			0.270** (0.127)	0.0867	0.022			-0.190 (0.177)	-0.0757
Moderate disability → Without disabilities	0.015			0.0886 (0.137)	0.0284	0.016			0.145 (0.210)	0.0578
Moderate disability → Moderate disability	0.048			0.153* (0.0800)	0.0492	0.072			-0.0769 (0.102)	-0.0307
Moderate disability → Severe disability	0.006			0.393** (0.198)	0.1262	0.012			-0.597** (0.250)	-0.2383
Severe disability → Without disabilities	0.006			0.366* (0.187)	0.1175	0.010			0.495* (0.268)	0.1975
Severe disability → Moderate disability	0.002			-0.115 (0.397)	-0.0369	0.006			0.636* (0.380)	0.2535
Severe disability → Severe disability	0.040			0.290*** (0.0815)	0.0931	0.082			-0.167* (0.0984)	-0.0665
Male	0.477	-0.127***	-0.0412	-0.128***	-0.0410	0.417	0.0990*	0.0395	0.0960*	0.0383

Age	(0.499)	(0.0381)		(0.0382)		(0.493)	(0.0558)		(0.0559)	
	54.018	-	-0.0100	-	-0.0101	52.039	-0.0133	-0.0053	-0.0122	-0.0049
	(15.894)	(0.00719)		(0.00717)		(16.053)	(0.00995)		(0.01000)	
Age ² /1000	3.171	0.245***	0.0792	0.246***	0.0790	2.966	0.111	0.0441	0.102	0.0407
	(1.688)	(0.0693)		(0.0690)		(1.684)	(0.0949)		(0.0952)	
Marital status:										
Single	0.098	-0.0206	-0.0067	-0.0224	-0.0072	0.156	-0.182**	-0.0724	-0.184**	-0.0735
		(0.0674)		(0.0674)			(0.0845)		(0.0846)	
Living without partner	0.133	0.153***	0.0495	0.150***	0.0481	0.199	-0.0102	-0.0041	-0.0217	-0.0087
		(0.0557)		(0.0557)			(0.0763)		(0.0767)	
Living with partner (<i>reference</i>)	0.769	-		-		0.644	-		-	
Household size	2.457	0.0245	0.0079	0.0230	0.0074	2.338	-0.0213	-0.0085	-0.0227	-0.009
	(1.141)	(0.0263)		(0.0263)		(1.213)	(0.0391)		(0.0390)	
Number of children in household	0.390	-0.0373	-0.0120	-0.0357	-0.0115	0.388	0.0112	0.0045	0.0125	0.005
	(0.788)	(0.0358)		(0.0358)		(0.791)	(0.0544)		(0.0543)	
Years of education	12.675	-0.00958	-0.0031	-0.00937	-0.0030	12.127	-0.00201	-0.0008	-0.00316	-0.0013
	(2.799)	(0.00766)		(0.00767)		(2.562)	(0.0112)		(0.0112)	
German	0.968	-0.420***	-0.1358	-0.424***	-0.1362	0.945	0.220*	0.0878	0.232**	0.0925
		(0.0895)		(0.0894)			(0.117)		(0.116)	
Log (real household income)	5.454	-0.187***	-0.0604	-0.184***	-0.0591	5.247	0.0398	0.0159	0.0346	0.0138
	(0.528)	(0.0426)		(0.0425)		(0.549)	(0.0592)		(0.0592)	
Employment status:										
Full-time (<i>reference</i>)	0.394	-		-		0.334	-		-	
Part-time	0.136	-0.0430	-0.0139	-0.0423	-0.0136	0.128	-0.0551	-0.0220	-0.0549	-0.0219
		(0.0612)		(0.0613)			(0.0894)		(0.0895)	
Non-working	0.469	0.0804	0.0260	0.0814	0.0261	0.538	-0.155**	-0.0619	-0.147**	-0.0585
		(0.0509)		(0.0509)			(0.0721)		(0.0722)	
Relational Time Index (RTI)	1.327	-0.165***	-0.0535	-0.163***	-0.0522	1.174	0.0949*	0.0379	0.0917	0.0366
	(0.488)	(0.0407)		(0.0408)		(0.505)	(0.0576)		(0.0578)	
Number of close friends	4.516	-	-0.0048	-	-0.0047	3.422	0.0316***	0.0126	0.0313***	0.0125
	(3.775)	(0.00563)		(0.00565)		(2.951)	(0.00920)		(0.00923)	
Regional dummies		<i>Yes</i>		<i>Yes</i>			<i>Yes</i>		<i>Yes</i>	
<i>Constant</i>	-	1.628***		1.619***		-	-0.00283		-0.00198	
		(0.304)		(0.303)			(0.441)		(0.442)	
Number observations			9,484		9,484			2,512		2,512

Baseline probability	0.2582	0.2548	0.4964	0.4893
Chi-squared	240,22	248,70	85,63	102,20
Pseudo R ²	0.0386	0.0401	0.0255	0.0304

Note: Robust standard errors in parentheses, stars for significance levels. Individuals aged 15 or over: ***p < 0.01, **p < 0.05, *p < 0.1. Source: Author's calculations using the German Socio-Economic Panel (SOEP) for the years 2013 and 2017.