



ORIGINAL

Predictors for Loneliness Perceived by the Interviewer or the Individual: Findings from Limited Disability Pensioners and Medical Rehabilitation Patients

Predictores de Soledad Percibida por el Entrevistador o el Individuo: Hallazgos de Pensionados con Discapacidad Limitada y Pacientes de Rehabilitación Médica

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Abstract

Loneliness can be seen as indicator of social participation which is a major concern of the UN Convention on the Rights of Persons with Disabilities. Temporary disability pensioners and medical rehabilitants are persons with disabilities, whose rights should be empowered. Moreover, loneliness is a major burden for the individual and finding ways to overcome loneliness are accordingly required. Previous research has shown that different socio-demographic characteristics, life-satisfaction and social support interrelate with loneliness. The aim of the present study was to replicate findings with two computer-assisted telephone interview studies with individuals insured with a local pension fund. While study 1 recruited N = 453 disability pensioners (mean age=50.4 years, 53.5 % female) and assessed their loneliness with the typical self-report measured by directly asking, study 2 recruited N = 1,044 patients in a medical rehabilitation (mean age=49.5 years, 36 % female) and used the reports of their interviewers without asking the study participants directly about their loneliness. In both studies, more life-satisfaction was significantly associated with less loneliness (beta=-.41 and -.23). However, only in the interviewer-rated study, higher social support was related to less loneliness (beta=-.16). Sex differences were found in the interviewer-rated study (women were rated as lonelier, beta=.11), while an interrelation with age was only found if self-reports were used in terms of younger disability pensioners reported more loneliness (beta=-.24). The findings open options for counseling to also improve self-reported life-satisfaction. While interviewers rate

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female interviewees as lonelier than men, interventions should not forget about men as they report equal loneliness if controlled for other variables. The results replicate that health and life-satisfaction are imperative and addressable to decrease loneliness. This should be researched further and used for interventions.

Keywords: Loneliness, Social Support, Life Satisfaction, Sex, Age

Resumen

La soledad puede ser vista como un indicador de la participación social, la cual es una preocupación importante para la Convención de las Naciones Unidas respecto a los derechos de personas con discapacidad. Los pensionados con discapacidad temporal y rehabilitantes médicos son personas con discapacidad, cuyos derechos deben ser empoderados. Aún más, la soledad es una carga significativa para el individuo y hallar maneras de sobreponerse a ésta es necesario. Investigaciones previas han mostrado que diferentes características sociodemográficas, la satisfacción con la vida y el apoyo social correlacionan con la soledad. El propósito del presente trabajo fue replicar hallazgos con dos entrevistas telefónicas apoyadas por computadora en individuos asegurados con un fondo local de pensión. El estudio 1 recolectó $N = 453$ pensionados con discapacidad (edad promedio = 50.4 años, 53.5% mujeres) y evaluó su soledad con una medida típica de auto-reporte que preguntaba de manera directa. El estudio 2 recolectó $N = 1044$ pacientes de rehabilitación médica (edad promedio = 49.5 años, 36% mujeres) y preguntó de manera indirecta a los participantes sobre su soledad. En ambos estudios, mayor satisfacción con la vida se asoció significativamente con menor soledad ($\beta = -.41$ y $-.23$). Sin embargo, sólo en el estudio que trabajó con valoraciones del entrevistador se encontró que mayor apoyo social se asoció con menor soledad ($\beta = -.16$). Se encontraron diferencias por sexo en el estudio con valoraciones del entrevistador (las mujeres fueron valoradas con mayor soledad, $\beta = .11$), mientras que la interrelación con edad se encontró únicamente si los autoreportes se utilizaban en términos de pensionados más jóvenes y si estos reportaban mayor soledad ($\beta = -.24$). Los hallazgos abren opciones para la consejería y para mejorar la satisfacción con la vida auto-reportada. Al tiempo que los entrevistadores describen a las mujeres entrevistadas como más solitarias que los hombres, las intervenciones no deben olvidar a los hombres ya que reportan niveles idénticos de soledad si se controlan otras variables. Los resultados replican que la salud y satisfacción con la vida son imperativas y deseables para disminuir la soledad. Esto debería investigarse más a fondo y ser utilizado para las intervenciones.

Palabras Clave: Soledad, Apoyo Social, Satisfacción con la Vida, Sexo, Edad

In 2007, the United Nations published the Convention on the Rights of Persons with Disabilities (CRPD, UN General Assembly, 2007). The CRPD replaces the traditional understanding of persons with disabilities as passive recipients of charity, medical treatment and social protection by viewing persons with disabilities as active agents, who have the ability of claiming their rights and making decisions for their lives based

on their free consent. Although the Convention was introduced more than ten years ago, it was rarely integrated into scientific work. This is especially important as the CRPD was intended as a tool to explicitly develop and ensure human rights and fundamental freedoms in all persons with all types of disabilities (UN General Assembly, 2007). The human right to develop socially can be conceptualized as social

participation (in terms of working, communication with family members and friends etc.). Also, for the World Health Organization, empowering and including vulnerable and excluded groups is crucial for ensuring social participation. Thus, social participation especially in individuals who are vulnerable because of limited health should be investigated systematically. The current paper aims for that.

While societies can provide the legal basis and offer support, individuals themselves have to be enabled to also mobilize support and ensure social participation themselves. To facilitate the mobilization of social support and to encourage social participation, it is necessary to identify persons who need support, for example, persons who feel lonely: Loneliness is an important indicator for (suboptimal) social participation (Niedzwiedz et al., 2016; Queen, Stawski, Ryan, & Smith, 2014) and thus a red flag to change as it signals to build or repair social connections (de Jong-Gierveld, 1987).

Loneliness and depleted social participation have detrimental consequences for individuals' self-evaluation (Lau & Kong, 1999) and their physical and mental health (Berkman, Glass, Brissette, & Seeman, 2000; Croezen, Avendano, Burdorf, & van Lenthe, 2015; Levasseur, Desrosiers, & Tribble, 2008). For example, Leigh-Hunt et al. (2017) found in their overview of systematic reviews that loneliness has negative interrelations with cardiovascular diseases (Leigh-Hunt et al., 2017) as well as psychological variables such as well-being, depression, suicide, dementia and life-satisfaction (Kong & You, 2013). The high prevalence of loneliness (in Germany around 10 percent (Beutel et al., 2017)) is surprising, given the fact that many efforts to ensure social participation have been made (e.g., through environmental projects such as the neighborhood projects, internet platforms/ forums but also individual approaches such as internet behavioral group therapy (Hopps, Pépin, & Boisvert, 2003). However, little is known about how professionals perceive clients as lonely, which will be addressed in the current paper with assessing interviewers regarding their rating of loneliness of the interviewee.

Previous research has dealt with the question why persons feel lonely. Formerly examined risk

factors include sex (Maes, Qualter, Vanhalst, Van Den Noortgate, & Goossens, 2016; Nicolaisen & Thorsen, 2014), age (Pinquart & Sörensen, 2003; Taube, Kristensson, Sandberg, Midlöv, & Jakobsen, 2015), unemployment (Creed & Reynolds, 2001; Lauder, Sharkey, & Mummery, 2004), poor social support (Bernardon, Babb, Hakim-Larson, & Gragg, 2011; Hawkley et al., 2008) and poor health (Holt-Lunstad, 2017; Taube et al., 2015). While some factors cannot be changed (e.g., age), other influences can easily be addressed in interventions (e.g., social support). Thus, it is important to consider more complex patterns and measurements. In the following sections, we give a brief overview about such previous findings regarding influences on perceived loneliness.

Sex and loneliness

Current findings concerning sex differences in feelings of loneliness seem to be mixed and depend on the type of measurement (Nicolaisen & Thorsen, 2014). In a meta-analysis, only a very small effect size ($d = 0.05$) was found, leading the authors to conclude that there are no systematic differences in loneliness between men and women (Maes et al., 2016). However, Cramer and Neyedley (1998) found a significant relationship between sex and loneliness when masculinity was partialized out (Cramer & Neyedley, 1998).

Thus, it seems that loneliness is a construct which does not fit to the male gender role. In line with that, Lau and Kong (1999) found in their experimental study that men (in comparison to women) are evaluated more negatively, when they are perceived as lonely (Lau & Kong, 1999). Thus, it is possible that gender roles exist which may negatively influence the evaluation of another person's loneliness. The authors recommended taking the sex of the target person into consideration which we will do accordingly.

Age and loneliness

Age seems to be a stable predictor for loneliness. Pinquart and Sörensen (2003) found in their

meta-analysis a U-shape relationship of loneliness in older age. Persons younger than 60 years and older than 70 years perceived themselves as lonelier than the age group in between (Pinquart & Sörensen, 2003). Researchers also found evidence for a self-fulfilling prophecy effect of loneliness in older adults. In their 8-year follow-up study, Pikhartova et al. showed that participants who agreed that loneliness increases with age indeed reported more loneliness when they got older (Pikhartova, Bowling, & Victor, 2016). However, there is no automatism that all aging persons have to feel lonelier over time.

It seems that there are risk factors related to older age which make it more likely to be lonely later in life. For example, if persons experience the death of the partner, health-related problems, limited mobility and an undesired housing situation the likelihood to feel lonely increases. Especially older persons in rural areas and persons who live alone perceive more loneliness (Havens, Hall, Sylvestre, & Jivan, 2004). However, a multimodal pattern across the whole lifespan was found indicating that feelings of loneliness occur mainly after critical life events such as moving out from the parents' home or grown-up children leaving home (Luhmann & Hawkley, 2016). Thus, changes in feelings of loneliness might be caused by experiencing typical life events rather than chronological age itself.

Employment, promotion of workability and disability pension

It was argued by researchers (e.g. Creed & Reynolds, 2001; Lauder et al., 2004) that persons who work in regular paid jobs suffer less from loneliness than unemployed persons. Unemployed persons may perceive more loneliness due to economic deprivation. It seems that there is an indirect effect: Unemployed persons have less money available which reduces their social participation. Because of their lack of financial resources, persons not working have fewer opportunities to participate in social life (e.g., go out with friends) and are thus lonelier. However, very little is known so far about persons not working because of health impairments and disabilities. Since health

impairments decrease social participation further (Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015; Rokach, Lechcier-Kimel, & Safarov, 2006), this state of feeling lonely may spiral downwards as negative consequences for future workability and employability result.

In Germany, health impairments or disabilities resulting in the inability to work can be compensated for with a temporary disability pension (reduced earning capacity pension). It is supposed to offer the individual time for regeneration and recovery. However, previous research has shown that individuals receiving a disability pension suffer from limited life-satisfaction and loneliness, and that further investigations are needed (Märting & Zollmann, 2013).

There is now a large number of studies on the social and psychological risk factors for entering temporary disability pension (e.g., Bethge, Egner, Streibelt, Radoschewski, & Spyra, 2011; Knudsen et al., 2010; Krokstad, Johnsen, & Westin, 2002). However, only a few studies (e.g., Köckerling, Sauzet, Hesse, Körner, & Razum, 2019; Zschucke, Hessel, & Lippke, 2016) shed light on the life situation of individuals who are at risk to become lonely due to their job and financial status after entering the disability pension. For example, Märting et al. (2012) found that in comparison to the average population, a larger proportion of disability pensioners are affected by poverty and a reduced quality of life (Märting, Zollmann, & Buschmann-Steinhage, 2012). In general, a negative correlation was also repeatedly found between life-satisfaction and loneliness (Goodwin, Cook, & Yung, 2001; Mellor, Stokes, Firth, Hayashi, & Cummins, 2008; Schumaker, Shea, Monfries, & Groth-Marnat, 1993).

Temporary disability pensioners are largely characterized as having a low life-satisfaction and a high number of specific stressors due to health limitations causing high levels of loneliness. In addition, change in life-satisfaction might have an impact on loneliness beyond the actual state of life-satisfaction since the individual or interviewer could see the change as indicator of future development. Moreover, a change in life-satisfaction might be more salient to individuals as well as independent interviewers than a constant

high or low state. Change in life-satisfaction occur quite frequently and was found to even be associated with the proximity of premature death (Fujita & Diener, 2005; Mroczek & Spiro III, 2005), but has not yet been investigated in relationship with loneliness.

Social support

In a study by Olstad et al., social support was found to buffer the negative effect of specific stressors occurring due to disability on mental distress (Olstad, Sexton, & Sogaard, 2001). Social support is also a good protective factor against loneliness (e.g., Bernardon et al., 2011). However, researchers found that especially the perception of meaningful (the opposite of superficial) interactions are important to feel less lonely (Wheeler, Reis, & Nezlek, 1983). Kong and You revealed that social support enhances the self-esteem, which in turn influences life-satisfaction and thus decreases loneliness (Kong & You, 2013). Furthermore, individuals are perceived as lonelier when they indicate to have low social skills. Possible pathways are that implicit cognitions about persons with lower social skills lead to the conclusion in others that they are less likely to mobilize social support and to have a positive social network (Lodder, Goossens, Scholte, Engels, & Verhagen, 2016; Segrin & Flora, 2000).

Parallel to changes in life-satisfaction, it is likely that not only the simple state of social support but also changes in social support are crucial for feelings of loneliness as perceived change can be a basis for future social support. If an individual loses important parts of his or her support network, this development might continue in the future since social context and network types are crucial (Stephens, Alpass, Towers, & Stevenson, 2011). Thus, the experience and anticipation of losing social support could contribute to feelings and ratings of loneliness regardless of the state of social support.

Loneliness and health

Health and loneliness are highly correlated (Lara et al., 2019; O'Suilleabháin, Gallagher, & Steptoe, 2019). In a meta-analysis, it was found that loneliness

increases the likelihood of premature mortality to 26% (Holt-Lunstad et al., 2015). Rockach, Lechier Kimel and Safarov (2006) examined loneliness in persons with physical disabilities as a multi-factor construct and found that those with disabilities experience higher levels on different loneliness factors (Rokach et al., 2006). More precisely, persons with physical disabilities perceive: (1) more emotional stress (e.g., feeling of hopelessness and emptiness), (2) social inadequacy and alienation (e.g., self-generated social detachment), (3) more self-alienation (e.g., detachment from one's own mind and body) and (4) less growth and discovery (e.g., enriching aspects of loneliness). Moreover, Peltzer and Pengpid found in a cross-national study that lonely persons perceive a high lack of control, which in turn can enhance the risk of mental diseases (Peltzer & Pengpid, 2017). Furthermore, it was found that lonely elderly persons have a poorer overall psychological and physical health (Taube et al., 2015).

Interpersonal perception of lonely persons

In a correlational study, Tsai and Reis found a negative relationship between the interpersonal perception of loneliness and the rating of interpersonal skills and desirable personality traits (e.g., openness). Furthermore, there is a negative relationship between loneliness and popularity, trusting and confidence (Tsai & Reis, 2009). However, "Loneliness may not be seen as a pathological state but seen by individuals as an understandable, although unwelcome, feature of their lives" (Lauder et al., 2004, p. 90). While this quote is mainly about individual perceptions of loneliness, one may wonder about the "individuals". The authors point out that the question remains if persons perceive loneliness only in themselves or in others, too, and whether the same pattern exist or whether there are differences. Interestingly, this was not examined before and is hence the main aim of the current paper.

The present research

As mentioned before, loneliness is defined in this paper as indicator of social participation (de Jong-Gierveld,

1987; Niedzwiedz et al., 2016; Queen et al., 2014). As presented above, many risk factors for feeling lonely have been identified. However, complex patterns to understand how loneliness manifests and develops have not yet been considered exhaustively (von Soest, Luhmann, Hansen, & Gerstorff, 2018). The current paper examines a more comprehensive and complex pattern of risk factors. The associations between loneliness, social support, life-satisfaction and sex are examined while considering reports of individuals as well as observer ratings from interviews with individuals.

The aim of the research is twofold. First, we aim to replicate previous findings regarding age, partner status and sex as well as life-satisfaction and social support in bivariate associations (1) from the perspective of the individual and (2) in terms of rating of others as lonely (i.e., interviewer ratings). Secondly, we aim to tease out the unique shared variance of the variables when controlling for each other. Both will be done in two study samples of individuals insured with one local pension fund and with longitudinal study designs. Examining the unique shared variances also means to test and control for change in social support and life-satisfaction. Our statistical hypotheses are the following:

Hypotheses

Hypothesis 1: Loneliness is (a) not correlated with age, and (b) positively with being without partner, but (c) negatively correlated with life-satisfaction and (d) social support.

Hypothesis 2: Loneliness is related to sex in terms of (a) that women are rated as lonelier than men (Study 2), but (b) do not report higher levels of loneliness themselves (Study 1).

Hypothesis 3: (If variables are controlled for each other,) Life-satisfaction and social support as well as changes in (a) life-satisfaction and (b) social support explain unique variance in both self-reported (Study 1) and interviewer rated loneliness (Study 2).

Methods

Study 1 (Individuals insured with a local pension fund and in temporary disability pension)

Participants

N = 453 individuals insured with the local pension fund *Deutsche Rentenversicherung Oldenburg-Bremen* (DRV) and currently receiving temporary disability pension were recruited to participate via a computer-assisted telephone interview (CATI) after being recruited by their pension fund. The participants of the study were aged $M = 50.40$ ($SD = 7.90$) years, 53.5 % were female and around 1.5 % of the participants were unemployed at T2 (0.9 % returned to work and all other remained in pension state). In total, less than 13% had a university entrance qualification.

Procedure

Analyses of the baseline data of this study have been published elsewhere (Zschucke et al., 2016). The study was approved by a data protection officer and the ethics committee of the German Psychological Society (DGPs; SL 012014_rev). The data on the follow-up measurement points is unique to this study and has not been published before. If the study participants did not explicitly withdraw their consent at the end of the baseline interview, the project staff called the individuals again after about 7 months (first follow-up, T1) and after 14 months (second follow-up, T2).

Measurements

Age, sex, partner status and education were measured during the CATI at the baseline. Perceived loneliness was measured by two items from the UCLA Loneliness Scale (Russell, 1996) at T1 and T2. The items were “How often do you feel unhappy to be alone?” and “How often do you feel like nobody really understands you?”. The possible answers ranged from 1 (“not at all”) to 2 (“on single days”) and 3 (“on more

than half of the days”) to 4 (“almost every day”). For further analysis, the sum score of the two items was calculated ($rT1 = .41$; $rT2 = .39$).

Life-satisfaction was assessed with an item from the socio-economic panel. Study participants were able to answer the question “How satisfied are you with your life in general at the moment?” on a four-step scale from 1 (“not satisfied at all”) to 4 (“very satisfied”). Social support was measured with three items concerning the support of family/ friends by helping participants to return to work by encouraging the individual to do so, to contact the employer, writing job applications and organizing the return to a daily routine with working (Paech, Fleig, Pomp, & Lippke, 2014). Participants were asked to answer the questions on a scale from 1 (“does not apply at all”) to 4 (“fully apply”). The internal consistency of these items was $\alpha T1 = .82$ and $\alpha T2 = .81$.

Study 2 (Individuals insured with a local pension fund and in medical rehabilitation to prevent disability)

Participants

Insurants in medical rehabilitation were assessed during their stay in a rehabilitation clinic. The study consisted of three measurement points. Recruitment of $N = 1.044$ participants was performed during the medical rehabilitation, T1 was about 17 months and T2 was about 24 months after rehab. The study participants were aged $M = 49.47$ ($SD = 9.03$) years, 36 % were female and around 28 % of the participants were unemployed at T2. In total, less than 13 % had a university entrance qualification.

Procedure

The study was approved by a data protection officer and the ethics committee of the German Psychological Society (DGPs; SL 112014) and was registered at Clinicaltrials.gov (NCT02415075). At T1 and T2, $N = 13$ student assistants ($n = 10$ female) carried out follow-up computer-assisted telephone interviews

(CATIs) with the participants. The interviewers were asked after they ended the interview with the insurant to rate his/ her perceived loneliness on a scale from 0 (“very low”) to 5 (“very high”) on basis of the interview. Data collected in the interview (which could have an influence on the perception of loneliness rated by the interviewer) were (1) health and illness, (2) taking part (or not) in rehabilitation aftercare, (3) measurements concerning workability, (4) social support and (5) sociodemographic variables. However, explicitly no self-report of loneliness was done to ensure that the interviewer would give a rating and not just a recall of what the interviewee said.

Measurements

Age, sex, partner status and education were measured at the rehab center. Psychological constructs included in this study were measured at the first and second follow-up, and those measures with more than one item were averaged. The ratings of the interviewer regarding loneliness of the insurant was also done after the two follow-up measurement points, and the interviewers were not informed about the answers of the study participants at baseline.

Life-satisfaction was asked with four questions at T2. The questions concerned life-satisfaction in general, with professional activities, physical activities and satisfaction with perceived health success through physical activity. All items could be answered on a scale from 1 (“not satisfied at all”) to 4 (“very satisfied”). The reliability of the items was $\alpha = .78$. Social support was measured (at T2) with four items concerning the support of family/ friends by helping participants promoting their health, their physical activity, and their return to work (Paech et al., 2014). Participants were asked to answer the question on a scale from 1 (“does not apply at all”) to 4 (“fully apply”). The internal consistency of these items was $\alpha = .78$.

Study 1 and Study 2 Participant Comparison

The descriptive data is displayed in Tables 1a and 1b. Disability pensioners were descriptively almost one

year older than rehabilitants ($d = 0.11$), but the difference was not significant ($p = .99$). Rehabilitants were descriptively better educated, but this was also not significant ($p = .98$). However, they were more likely to have a partner and to be male ($p < .05$).

Change scores and analyses with both studies

As hypothesis 3 also regarded the change in social support and life satisfaction, the change in self-rated life-satisfaction between T1 and T2 and the change in self-rated received social support of the participants was calculated: The means of the relevant constructs (described in the measurement parts for both studies) were created (for life-satisfaction at T1 and T2; and for social support at T1 and T2). Then, we subtracted the assessment from measurement time point T2 from T1. Thus, a value of zero means no change over time, a positive value means a positive change to T2 (e.g., persons experienced more life-satisfaction at T2 in comparison to T1), and a negative value means a negative change to T2 (e.g., persons experienced less social support at T2 than at T1). This calculation makes it possible to test whether a positive or a negative change over both measurement time points interrelates with the interviewers rating of loneliness. Again, the interviewer at T2 did not know the rating of the participant at T1 so that a direct influence could be excluded.

Analyses

IBM SPSS Statistics 25 was used for data analyses of descriptive statistics, intercorrelation (correlation analyses, regression analyses) and group analyses (ANOVA, MANOVA).

Results

Study 1

Descriptive Statistics

The descriptive statistics (means and standard deviations or percentages) and correlations between the

relevant constructs are shown in Table 1a. Younger disability pensioners are more educated, more likely to have a partner, have a lower life-satisfaction and less social support. Education and partner status were not associated with any other construct measured. Male pensioners report more social support. Those with higher life-satisfaction at baseline also report a higher increase on life-satisfaction and less loneliness at both follow-up measurement points. Improving life-satisfaction over time is correlated with lower loneliness at both follow-up measurement points. Social support at baseline was correlated with a further increase in social support but not with life-satisfaction or loneliness. Finally, persons who report lower loneliness are younger, more satisfied with their life, more likely to improve their life-satisfaction over time and also to feel less lonely at the other follow-up measurement point.

Sex differences

To test if there are any differences in the perception of loneliness between men and women, we conducted a one-way MANOVA (sex of the participant male vs. female as independent variable and self-rated loneliness at T1 as well as T2 as dependent variables). At the first follow-up measurement point, women reported about the same level of loneliness ($M = 4.12$, $SD = 1.79$) as men did ($M = 4.17$, $SD = 1.84$; $F[1,223] = 0.04$, $p = .85$, $\eta^2 = .01$). However, at the second follow-up measurement point, women reported higher levels of loneliness than men ($F[1,244] = 1.89$, $p = .17$, $\eta^2 = .02$). There was no main effect for time ($F[1, 164] = 1.80$; $p = .18$; $\eta^2 = .01$) and the interaction between time and sex of the participant was also nonsignificant ($F[1, 164] = 1.36$; $p = .25$; $\eta^2 = .01$). Results are shown in Figure 1a.

Linear regression

To test our hypotheses regarding the prediction of loneliness in pensioners, we conducted a regression analysis with eight predictors, namely (1) age, (2) education, (3) partner status, (4) sex of the participant, (5) life-satisfaction at the first follow-up measurement

Table 1a
Descriptive statistics of the different constructs (Study 1, insurant with temporary disability pension)

	M/%	SD/%	1	2	3	4	5	6	7	8	9	10
1. Age	50.40	7.90	1									
2. Education ¹	2.4% no school degree	9.5% university qualification	-.15**	1								
3. Partner status	213 = partnered (47.1%)	238 = single (52.7%)	-.18**	.06	1							
4. Sex of the participant (female)	210 male (46.5%)	242 female (53.5%)	-.03	.01	.08	1						
5. Life-satisfaction T1	2.18	0.85	.12*	-.07	-.06	.01	1					
6. Change life-satisfaction (T2-T1)	2.26	0.80	.07	-.02	-.06	.01	.54**	1				
7. Social support T1	5.56	2.88	-.13**	-.08	-.06	-.11*	.09	.05	1			
8. Change social support (T2-T1)	4.15	1.23	-.10	-.03	.01	.00	.04	.08	.28**	1		
9. Loneliness T2	4.14	1.85	-.26*	-.00	.02	-.01	-.31*	-.34*	.04	.03	1	
10. Loneliness T3	4.04	1.75	-.16**	-.04	.10	.12	-.31**	-.24**	.03	-.01	.64**	1

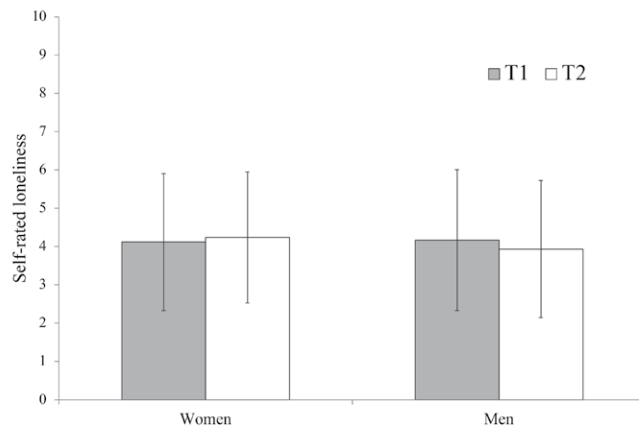


Figure 1a. Study 1 (insurant with temporary disability pension). Perceived loneliness of male and female participants. * $p < .05$. Error bars represent standard errors

Table 2a
Linear regression predicting the reported loneliness. Study 1 (insurant with temporary disability pension)

Predictors	B	SE	β	R^2_{adj}
Age	-.06	.02	-.24**	.15
Education	-.04	.08	-.03	
Partner status	-.07	.09	-.06	
Sex of the participant (female)	.14	.24	.04	
Life-satisfaction T1	-.87	.17	-.41**	
Change life-satisfaction (T2-T1)	-.57	.17	-.26**	
Social support T1	.03	.10	.06	
Change social support (T2-T1)	.01	.10	.01	

Note: ** $p < .01$.

point, (6) change in life-satisfaction to the second measurement point, (7) social support at the first follow-up measurement point, and (8) change in social support to the second measurement point. The whole model was significant ($F[8,190] = 5.47, p < .001$) and accounted for 15% of the variance. Results are depicted in Table 2a. Age was significant in terms of younger pensioners reporting more feelings of loneliness. Education, partner status and sex of participant were not significant. Thus, contrary to the bivariate finding, female participants did not feel lonelier after

controlling for the other variables. Life-satisfaction at the first follow-up measurement point and the change in life-satisfaction were significant, meaning that a negative change in life-satisfaction between T1 to T2 was correlated to a higher rating of loneliness. The bivariate result that social support at the first follow-up measurement point was uncorrelated with loneliness was replicated, as also the finding, that change in social support did not predict loneliness. Thus, the variance of loneliness was only explained by age, baseline life-satisfaction and change in life-satisfaction.

Study 2

Descriptive Statistics

The descriptive statistics of the relevant constructs are shown in Table 1b. The table also shows the correlation coefficients between the relevant constructs. Younger persons in medical rehabilitation are more educated and have a higher life-satisfaction, but a smaller increase in life-satisfaction over time. Moreover, rehabilitants with a partner are more likely to be male, to report a lower life-satisfaction and less social support at baseline. Those with a partner receive more social support over time and are perceived as less lonely. Men report better life-satisfaction and are perceived as less lonely than women on this bivariate level.

Finally, rehabilitants who report lower life-satisfaction at baseline improve their life-satisfaction over time and are rated as lonelier. An increase of life-satisfaction over time is correlated with a decrease in loneliness. Also, more social support at baseline is correlated with less loneliness, however, an increase in social support was uncorrelated with loneliness.

Sex differences. To test whether there are any differences in the perception of loneliness between men and women we conducted a 2 (sex of the interviewer) x 2 (sex of the participant) factor ANOVA.

As predicted, women were rated as lonelier than men ($F[1, 294] = 5.40, p = .02, \eta^2 = .02$). There was no main effect for sex of the interviewer ($F[1, 298] = 1.01, p > .10$) and no interaction between the sex of the interviewer and sex of the participant ($F[1, 298] < 1$). Results are shown in Figure 1b.

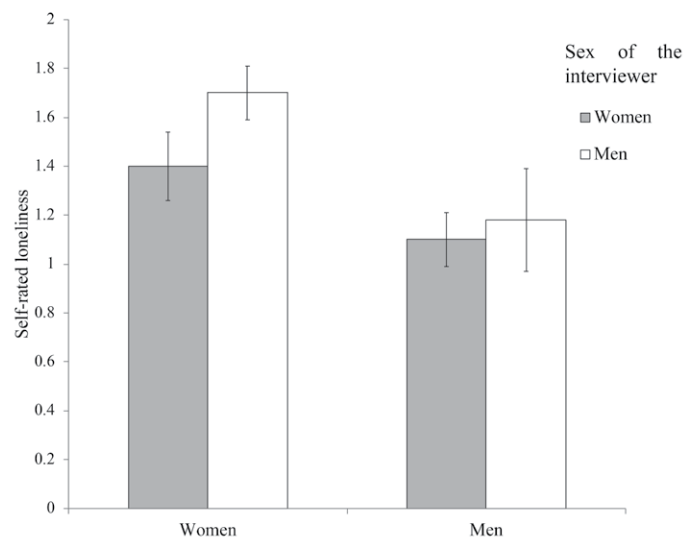


Figure 1b. Study 2 (insurant in medical rehabilitation to prevent disability). Male and female interviewers rating of loneliness of male and female participants. * $p < .05$. Error bars represent standard errors

Table 1b

Descriptive statistics of the different constructs (Study 2, insurant in medical rehabilitation to prevent disability)

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. Age	49.47	9.03	1								
2. Education	1.2% no school degree	13.2% college qualification	-.23**	1							
3. Partner status	585 = partnered (61.8%)	349 = single (36.9%)	.15	-.03	1						
4. Sex of the participant (female)	598 male (64%)	337 female (36%)	.06	.06	-.09**	1					
5. Life-satisfaction T1	2.40	0.62	.11**	-.03	.13**	-.11**	1				
6. Change life-satisfaction (T2-T1)	0.39	0.71	-.13*	.07	-.07	.08	-.52**	1			
7. Social support T1	2.68	0.83	.00	-.00	.30**	-.04	.18**	-.06	1		
8. Change social support (T2-T1)	0.12	0.94	-.08	.02	-.13*	.06	-.08	.05	-.61**	1	
9. Loneliness T2	1.30	1.25	.02	-.11	-.14*	.15**	.14**	-.12*	-.15*	-.03	1

Note. $N > 302$, ¹ 85.6% with a high school degree or comparable which does not qualify to enter university. * $p < .05$, ** $p < .01$

Table 2b
Linear regression predicting the perceived loneliness. Study 2 (insurant in medical rehabilitation to prevent disability)

Predictors	<i>B</i>	<i>SE</i>	β	R^2_{adj}
Age	.00	.01	.01	.12
Education	-.11	.06	-.11 ^a	
Partner status	-.26	.16	-.10	
Sex of the participant (female)	.29	.15	.11*	
Life-satisfaction T1	-.48	.14	-.23**	
Change life-satisfaction (T2-T1)	-.40	.12	-.23**	
Social support T1	-.25	.12	-.16*	
Change social support (T2-T1)	-.20	.01	-.06*	

Note: * $p < .05$. ** $p < .01$. ^a $p < .07$

Linear regression

To test our hypotheses regarding the prediction of loneliness in rehabilitants, we conducted a regression analysis as in study 1 with eight predictors, namely (1) age, (2) education, (3) partner status, (4) sex of the participant, (5) life-satisfaction at T1, (6) change in life-satisfaction (T1 to T2), (7) social support at T1, and (8) change in social support (T1 to T2). The whole model was significant ($F[8, 279] = 5.69, p < .001$) and accounted for 12% of the variance. Results are depicted in Table 2b. Age, education, and partner status were not significant. Sex was significant in terms of that female participants were rated as lonelier. Furthermore, life-satisfaction at T1 and the change in life-satisfaction were significant, meaning that a negative change in life-satisfaction between T1 to T2 led to a higher rating of loneliness. The bivariate result that social support at T1 correlated with loneliness was replicated, but in the regression model, change in social support also became significant. Thus, the variance of interviewer-rated loneliness was explained by sex of the participant, as well as the reports by the participant at T1 and change in life-satisfaction as well as baseline and change in social support.

Discussion

The aim of this paper was to examine the interrelation of loneliness with sex, age, partner status,

life-satisfaction and social support in insurants with limited health over time using bivariate analyses and a multiple regression model. Study participants were individuals with a time-limited disability pension (study 1) or participating in medical rehabilitation (study 2). Loneliness was investigated from the (typically taken) perspective of the individual (study 1) and the (rather rarely taken) rating of an interviewer (study 2). The later one is unique and important as interviewer ratings need to be understood better when providing professional help.

Only partially in accordance with our hypothesis 1a, age was found to be uncorrelated with loneliness for the rehab patients in the other-rated loneliness study but negatively correlated in disability pensioners in the self-report loneliness study. When significant, younger age predicted higher feelings of loneliness. The finding of the multiple regression validated the finding of the bivariate correlations where younger pensioners showed lower levels of loneliness and age of rehabilitants was not correlated. One explanation could be that in younger disability pensioners this state of temporary disability pension was more perceived as a critical life event, namely having to quit working due to health reasons, after which feelings of loneliness are typical (Luhmann & Hawkey, 2016; Øverland et al., 2008). This might have had a greater impact especially on the younger study participants who accordingly felt lonelier. Hypothesis 1b could be confirmed in the rehabilitation study only in terms of those being with a partner were rated as being less lonely on a bivariate level, however, this was not validated in the regression analysis nor in the self-rated loneliness study. Hypotheses 1c was fully supported with the regression analyses. Disability pensioners and rehabilitants who were more satisfied with their life-satisfaction also reported lower loneliness i.e. were rated as less lonely. Hypothesis 1d was only supported in rehabilitants who were rated as less lonely if they received more social support. Hypothesis 2 could be supported as we found that female insurants were rated as lonelier than male insurants, but insurants did not report significantly higher levels of loneliness themselves. Finally, in both studies, we found that higher loneliness was associated with a

decreasing life-satisfaction over time, which is consistent with our hypothesis 3a. However, hypothesis 3b could only partially be supported as only for medical rehabilitants change in social support was interrelated with loneliness but not for disability pensioners.

Summarizing, some of our hypotheses were too simple for the complex pattern of variables associated with loneliness. In line with the model by Berkman et al. (2000), which proposes that social networks impact health, we found that life-satisfaction is an important factor in explaining loneliness. We stated that only social support is imperative for an interviewer and rater; however, the raters seemed to take life-satisfaction into consideration when estimating loneliness in the interviewees. In both studies, baseline life-satisfaction as well as change in life-satisfaction predicted feelings of loneliness. The relationship between life-satisfaction and loneliness has been confirmed in a variety of age groups and contexts before (Bozoglan, Demirer, & Sahin, 2013; Kong & You, 2013; Levasseur et al., 2008; Victor, Scambler, Bond, & Bowling, 2000). Our paper adds the knowledge that life-satisfaction is surprisingly important in observer ratings. Additionally, this is to our knowledge the first study to show that life-satisfaction and loneliness are highly correlated in a sample of disability pensioners and medical rehabilitation patients. In these specific subgroups, life-satisfaction and social participation are crucial predictors of returning to work (Eckhard, 2018). In order to enhance social participation, life-satisfaction is crucial according to our results and should hence be regarded in interventions. Enabling rehab patients to overcome loneliness requires improving life-satisfaction and social participation.

The most important strength of this study is the comparison between different perspectives. Loneliness was investigated from the typically taken perspective of the individual and the rather rarely taken rating of an interviewer in two subgroups of the same insured group. This enabled us to show what biases an interviewer might have when estimating feelings of loneliness without explicitly asking, for example, concerning sex and social support. In line with hypothesis 3, sex was a predictor of loneliness in the

study with interviewer-ratings. In the self-ratings, sex was not a predictor when accounting for (change in) life-satisfaction and social support. This is in line with results from the study of Cramer and Neyedley (1998) who showed that sex differences in loneliness reflect male gender role perceptions in society (Cramer & Neyedley, 1998). Thus, interviewers might not recognize loneliness in males.

In addition, social support seems to be overestimated in comparison to self-reports, which could have been due to implicit theories about causes of loneliness (Rudolph, 2010). If an interviewer perceives a person as lonely, he or she might attribute this perception to a lack of social support, which is not necessarily the case (as shown in study 1). However, it also needs to be borne in mind that social support was operationalized differently in the two studies. To our knowledge, implicit theories have not yet been investigated explicitly in loneliness and social support has been shown to be an important predictor for loneliness and social participation. Hence, it should be regarded in interventions targeting loneliness and life-satisfaction although we did not find it as a predictor in our self-reported data.

In our studies, another strength is the longitudinal design allowing us to draw some conclusions about the causal prediction of loneliness by life-satisfaction and social support. Additionally, changes in life-satisfaction and social support were considered in our analysis. In line with hypothesis 3, we found that not only the current state but also changes in life-satisfaction and social support over time predicted loneliness and thus social participation. This leads to the conclusion that not only interventions targeted at establishing new social networks, but also preventive strategies to keep existing social bounds are effective in preventing loneliness and thus ensuring social participation. In addition, managing a low level of social support might be more beneficial than building unsustainable social networks or undermining intrinsic motivation. If social support and life-satisfaction are enhanced in the short- but not in the long-term, this might be even more detrimental for social participation than interventions that cannot ensure constant social support and life-satisfaction.

However, there are several limitations to the study design. The most important limitation is that a 2-factor design would have been more favorable: both groups should have been assessed by self-ratings and other-ratings. Practically, this was not possible as the interviews were conducted via computer-assisted telephone interviews (CATIs). Interviewers would have been influenced by the direct question to the interviewee. The subgroups were not separated because all study participants were supposed to be assessed equally. In the future, however, this should be assessed more systematically. Although the two studies regarded different subgroups of the same insurant group, the first was carried out with disability pensioners and the second with rehab patients during and after a stay in a rehabilitation center. The two groups seem comparable concerning their age and education, and interrelations (e.g., younger participants are more educated but have a lower life-satisfaction in both groups). However, they are not in the exact same stage concerning their disabilities or return to work which might have had an influence on the results.

Another limitation is that although the same constructs were measured in the two samples, instruments differed slightly concerning social support and life-satisfaction. Social support measures were adapted to the specific social support provided for the needs of disability pensioners and rehab patients. Although the adapted measures were used to assess the crucial support in the specific situation, this might have caused some of the differences between the two groups. Life-satisfaction was measured with a single item in the first subgroup but with an averaged scale in the second subgroup. However, since life-satisfaction as well as change in life-satisfaction were crucial predictors in both groups, this relationship seems to be independent from the different measures (cf. Victor et al., 2000). Finally, the measurement time points were not the same in the subgroups. In the second study, the rehab patients were assessed after longer follow-up periods (17 and 24 months) compared to the disability pensioners in the first study (7 and 14 months) which might have caused differences.

Nevertheless, the present study supplements studies on the social situation of temporary disability

pensioners with a psychological perspective and provides a starting point for further work. For example, it is crucial to increase social support and life-satisfaction in order to reduce loneliness and social participation and with that, likelihood for return to work or other forms of productivity. Thus, long-term disability and severe physical problems might be avoided. A low number of social contacts and low life-satisfaction are inhibiting factors for a successful return to work (Eckhard, 2018). Increasing social support and life-satisfaction more effectivity can thus lead to more positive rehabilitation outcomes. Furthermore, loneliness is a health hazard affecting psychological and physical health (Cacioppo & Cacioppo, 2014). In the future, this line of work could eventually help to reduce healthcare and rehabilitation costs.

The relationships identified in this paper and former work are relevant for designing interventions for disability pensioners and rehab patients. The results suggest that strengthening life-satisfaction and thus reducing loneliness is important for reintegration into working life and social participation. A participative and direct personal approach to contact those affected is probably more effective than a passive “wait-and-see” approach. Low-threshold contact, for example, by personal counseling, could be helpful. Although individual case management requires more counseling resources than a generic approach, it is likely to be more cost-effective. Improved social participation and life-satisfaction can theoretically also lead to (quicker) return to work and hence avoid high compensation costs.

Comprehending, since 2007, the Convention on the Rights of Persons with Disabilities (CRPD) demands actions to promote and ensure social participation of all persons with disabilities (UN General Assembly, 2007). The UN clearly emphasizes the role of environmental conditions and the society. In former research, it has been shown that ensuring the human right of social participation has not yet been achieved. In our current research, we use loneliness as indicator of social participation in order to identify important risk factors inhibiting social participation. We found that life-satisfaction and – in case of self-reported loneliness – social support systems need to be

addressed when targeting loneliness and social participation in the future. If these aspects are addressed, social participation can be increased, thus fulfilling the demands of the CRPD.

Additionally, persons receiving reduced earning capacity pensions have rarely been acknowledged as persons with inhibiting disabilities even though the pension is officially called “disability pension”. Clearly, the definition of disability given in the CRPD includes disability pensioners whose impairments need to be acknowledged and re-evaluated in the context of environmental barriers inhibiting their social participation. However, the finding that younger pensioners suffer more calls for early actions which should be implemented more effectively during medical rehabilitation.

Key Messages and Conclusion

1. In this study, the correlations between loneliness, life-satisfaction and social support were examined in temporary disability pensioners (self-rated loneliness, 8-month time-lag) or medical rehabilitation (interviewer-rated loneliness, 7-month time-lag).
2. Loneliness was found to negatively correlate with life-satisfaction, and change in life-satisfaction in both studies, but with social support only in rehabilitants but not in pensioners.
3. Sex differences were found in terms of women in disability pension at the second follow-up reported feeling lonelier (but not at the first follow-up, and not on a correlational level), and women in medical rehabilitation were rated to be lonelier than men.
4. These results show the central importance of life-satisfaction to improve loneliness as indicator of social participation in temporary disability pensioners and medical rehabilitants.

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