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Does engagement in productive activities affect mental health and well-being in older adults with a chronic physical disability? Observational evidence from a Swiss cohort study

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ABSTRACT

Objectives: To investigate type and load of productive activities as potential determinants of mental health and well-being in elderly persons with a physical disability.

Methods: We used data from a Swiss population-based sample of 314 adults at or past the legal retirement age (65 for men, 64 for women) who live with a chronic physical disability, spinal cord injury. Engagement in housework, volunteering, and paid work were dichotomized (no; some engagement) and three groups of engagement types were constructed (none; housework only; volunteering and/or paid work). Load of engagement was appraised using a sumscore on the overall frequency as well as the total number of performed activities. We used regression modelling to draw causal inference regarding the associations of type and load of engagement with general mental health (Mental Health Inventory, SF-36), self-reported depression (Self-Administered Comorbidity Questionnaire, SCQ), and well-being (WHOQoL-BREF items).

Results: Engagement in volunteering was positively related to well-being. Persons engaged only in housework reported better well-being and lower prevalence of depression than non-engaged persons, however, persons engaged in volunteering or paid work reported the highest well-being and the lowest prevalence of depression. The productivity sumscore tertiles and the number of performed activities were both positively linked to well-being and negatively linked to depression, while their association with general mental health was less pronounced.

Conclusion: Strengthening the engagement in productive activities among the elderly with a chronic physical disability is suggested as a promising strategy to promote well-being and reduce the prevalence of depression.

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KEYWORDS

Older age; productive activities; mental health; depression; well-being; disability; spinal cord injuries

Background

Activity theory posits that engagement in productive activities, such as volunteering, housework or paid work beyond the retirement age, fulfil important psychological and social needs that contribute to mental health and well-being (Lindenberg & Frey, 1993; Siegrist, Knesebeck, & Pollack, 2004). The needs met by engaging in productive activities include the development and maintenance of skills and competences (Bandura, 1986; Ryff & Singer, 1998), reward and appreciation from others (Kim, 2013; Pearlin, 1989; Siegrist, 2005), social inclusion (Berkman & Glass, 2000; Bowlby, 1969), and feelings of usefulness (Gruenewald, Karlamangla, Greendale, Singer, & Seeman, 2007).

Although empirical evidence supports the notion that engagement in productive activities in older age exerts beneficial effects on mental health and well-being (Baker, Cahalin, Gerst, & Burr, 2005; Hao, 2008; Kim, 2013; Li, Xu, Chi, & Guo, 2014; Menec, 2003; Wahrendorf, Ribet, Zins, & Siegrist, 2008), the effects depend on the type of activity (Choi, Stewart, & Dewey, 2013; Liu & Lou, 2017). Findings from systematic reviews suggest for example that

caregiving is negatively (Schulz & Sherwood, 2008) and volunteering is positively related to mental health and well-being (Jenkinson et al., 2013). The number and temporal load of productive activities are another source of variation in findings. While mental health and well-being among older persons who engage in at least one activity is generally better than in non-engaged persons, there seems to be a threshold limiting these positive effects, either in terms of number of simultaneous engagements or in terms of temporal load (Hao, 2008; Jenkinson et al., 2013). Furthermore, some studies have only investigated qualitative aspects of productive activities that may be instrumental in producing positive effects on well-being, such as the experience of appreciation, reward, self-esteem or personal control (McMunn, Nazroo, Wahrendorf, Breeze, & Zaninotto, 2009; Thoits & Hewitt, 2001; Wahrendorf, Ribet, Zins, Goldberg, & Siegrist, 2010).

In view of the extra physical and psychological effort it takes for people with disabilities to engage in productive activities, it remains unknown whether the positive psychological and socio-emotional experiences of productive activities balance or even outweigh the efforts needed or,

if at all, positive experiences are restricted to a certain type or load of engagement. In this study, we set out to fill in this research gap by testing the assumptions of activity theory in a sample of older adults who sustained a major physical disability, namely a spinal cord injury (SCI). An SCI is a traumatic or non-traumatic damage to the spinal cord that induces a complete or partial loss of sensation and movement below the lesion level and oftentimes leads to major physical disability (Bickenbach, Officer, Shakespeare, & von Groote, 2013). The objective of this study is thus to investigate the association of type (housework, volunteering, paid work) and load of productive activities with mental health and well-being in a sample of an older adults with SCI. We hypothesize, first, that the engagement in any type of productive activity is positively related to mental health and well-being and, second, that the total load of productive activities is positively associated with mental health and well-being.

Methods

Design

Cross-sectional data from the population-based community survey of the Swiss Spinal Cord Injury Cohort Study (SwiSCI) were used (Post et al., 2011). Data were collected between late 2011 and early 2013 and response options included paper-pencil or online questionnaires, and in special cases, telephone interviews (Brinkhof, Fekete, Chamberlain, Post, & Gemperli, 2016; Fekete, Segerer, Gemperli, & Brinkhof, 2015). Details on the study design and recruitment procedures are reported elsewhere (Brinkhof et al., 2016; Fekete et al., 2015). The SwiSCI community survey was approved by the Ethics Committees of all involved Cantons [Medical Ethical Committee of the Canton Lucerne (document 11042), Basel (document 306/11) and Valais (document 042/11)]. The study protocol has been approved by the Steering Committee of the SwiSCI study and all participants signed a written consent form.

Sampling frame and participants

Swiss residents with a traumatic or non-traumatic SCI aged over 16 years were eligible for the SwiSCI survey. Databases from the national association for persons with SCI (Swiss Paraplegic Association), three specialized SCI-rehabilitation centers, and a SCI-specific home care institution were used to identify potential study participants (Post et al., 2011). Of 3144 eligible persons, 1549 completed the first two questionnaires that were relevant for the present study representing a cumulative response rate of 49.3%. In-depth information on exclusion criterion, recruitment outcomes, participation rates, and non-response is described elsewhere (Brinkhof et al., 2016; Fekete et al., 2015). In this study, we used data from persons beyond the retirement age, defined by the legal age of employment in Switzerland (65 in men; 64 in women) who responded to the mental health and well-being questions ($n = 314$).

Measures

Engagement in productive activities was assessed with the Utrecht Scale of Evaluation in Rehabilitation-Participation (USER-P), which consists of three subscales on participation frequency, restrictions, and satisfaction (Post et al., 2012). Satisfactory psychometric properties (i.e., construct, concurrent, and discriminative validity, reproducibility, responsiveness) of the USER-P have been demonstrated in rehabilitation outpatients and SCI populations (Post et al., 2012; van der Zee, Post, Brinkhof, & Wagenaar 2014). We used three items from the USER-P frequency subscale measuring engagement in housework, volunteering and paid work on a six-point scale (0 = 0; 1 = 1–8; 2 = 9–16; 3 = 17–24; 4 = 25–35; 5 = over 35 hours per week). As the engagement frequency was low in our sample, binary variables were built (no engagement; some engagement). Type of engagement was further assessed with a variable on the combination of different activities (no engagement; only housework; volunteering or paid work). The sumscore over the three frequency items (range 0–15) and the number of performed activities were used to assess the engagement load. Given the low number of persons scoring above 4 ($n = 26$), the sumscore was classified into tertiles (score 0; score 1–2; score ≥ 3). Number of activities was assessed by adding the number of productive activities in which a person was engaged in. As only 15 persons were engaged in all activities, a three-categorical variable was built (none; 1 activity; 2 or 3 activities).

General mental health was assessed with the five-item Mental Health Inventory of the SF-36 version 1 (MHI-5) (Ware & Sherbourne, 1992), which has been psychometrically tested for SCI populations (van Leeuwen, van der Woude, & Post, 2012). The MHI-5 captures the frequency of emotional states in the last four weeks on a six-point scale. Based on established algorithms, a score ranging from 0–100 was calculated over the five items (Ware, Snow, Kosinski, & Gandek, 1993), with higher scores indicating better mental health.

Self-reported depression was assessed with a single item from the Self-Administered Comorbidity Questionnaire (SCQ), asking participants whether they are currently diagnosed with a depression (yes; no). The SCQ was evaluated as efficient method with satisfactory reliability and validity to capture self-report comorbidities (Sangha, Stucki, Liang, Fossel, & Katz, 2003).

Well-being was measured with a five-item selection of the WHOQoL-BREF (WHO, 2004), which was psychometrically tested in SCI populations (Geyh, Fellinghauer, Kirchberger, & Post, 2010). The items assess the persons' appraisal of the overall quality of life and satisfaction with their health, social relationships, activities of daily living, and living conditions. A sumscore ranging from 0 to 20 was built over the five items, with higher scores indicating better well-being.

Confounders

A directed acyclic graph (DAG; www.dagitty.net) was drawn to visualize the interrelationships of productive activities, mental health, well-being and various factors that potentially affect this association (Figure 1). The purpose of DAGs

is to support analysis planning through the identification of 'true' confounders and causal and biasing paths in complex causal diagrams (Textor, Hardt, & Knuppel, 2011). After a literature-based selection of candidate confounders, the interrelation between predictors, outcomes and the selected covariates were explored by bivariable statistics. Based on the resulting DAG and the bivariable analysis, age, sex, years of education, pain, secondary health conditions, and functional independence were included as confounders. Financial hardship was not included as it acts as partial mediator and its inclusion would introduce bias on the estimates of the direct effect of productive activities on mental health or well-being. Adjustment for lesion level (paraplegia, tetraplegia), lesion completeness (complete, incomplete) and etiology (traumatic, non-traumatic) was also not supported by the DAG, which indicates that potentially biasing paths are fully blocked by the inclusion of functional independence. Functional independence was assessed with Rasch-based scores of the Spinal Cord Injury Independence Measure for Self-Report (Proding, Ballert, Brinkhof, Tennant, & Post, 2016). Pain was measured with a single item indicating whether participants had pain during the past seven days and secondary health conditions were assessed with the Spinal Cord Injury Secondary Conditions Scale assessing the intensity of 14 SCI-specific acute health conditions on a 0–3 response scale (Kalpakjian, Scelza, Forchheimer, & Toussaint, 2007). A sumscore over 14 items was calculated (range 0–42); pain was excluded as this health condition was introduced separately.

Statistical analyses

Analyses were conducted using STATA version 14.1 for Windows (College Station, TX, USA). Where applicable, missing values in the productivity items were complemented by available information on the current employment situation (housewife, houseman; paid work). Missing values were accounted for using multiple imputation (MI) by chained equations (MICE), imputing categorical, ordinal

and linear variables in one model (White, Royston, & Wood, 2011). We created 20 imputed datasets.

Descriptive analyses were used to examine unadjusted distributions of engagement in productive activities, potential confounders, mental health and well-being. Cross-tabulations were performed to investigate crude associations of type and load of productivity with mental health and well-being. We report mean and standard deviations (SD) of the well-being and general mental health scores across categories. Wilcoxon-Mann-Whitney-tests were applied for comparisons of means between two groups. Kruskal-Wallis-tests were applied for comparisons of means across categorical variables and Cuzicks' tests for trend across ordered groups were used to evaluate the ordering of estimates between groups. For depression, we present the frequency and percentage of persons reporting depression and apply chi-square tests to assess potential group differences.

Tobit regressions were applied to evaluate the association between productive activities and the continuous well-being and general mental health scores. Tobit models account for the right censoring in the well-being and general mental health scores (Tobin, 1958). Logistic regressions were used to assess the association between productive activities and the binary outcome of depression. All models were adjusted for age, sex, years of education, pain, secondary health conditions, and functional independence (see Figure 1). Variables on productive activities were categorical and the group with no engagement was used as reference category. As sensitivity analysis, models for well-being were controlled for general mental health, considering that mental health may affect productivity as well as well-being. To control for confounding by depression we included the MHI-5 score in regression modelling. The MHI-5 is a valid screening instrument for depression in the elderly (Trainor, Mallet, & Rushe, 2013; Friedman, Heisel, & Delavan, 2005).

In respective Tables, *beta* coefficients for Tobit regressions, odds ratios (OR) for logistic regressions, 95% confidence intervals (CI), and *p*-values from equal fraction-missing-information (FMI)-tests are provided. The FMI is an

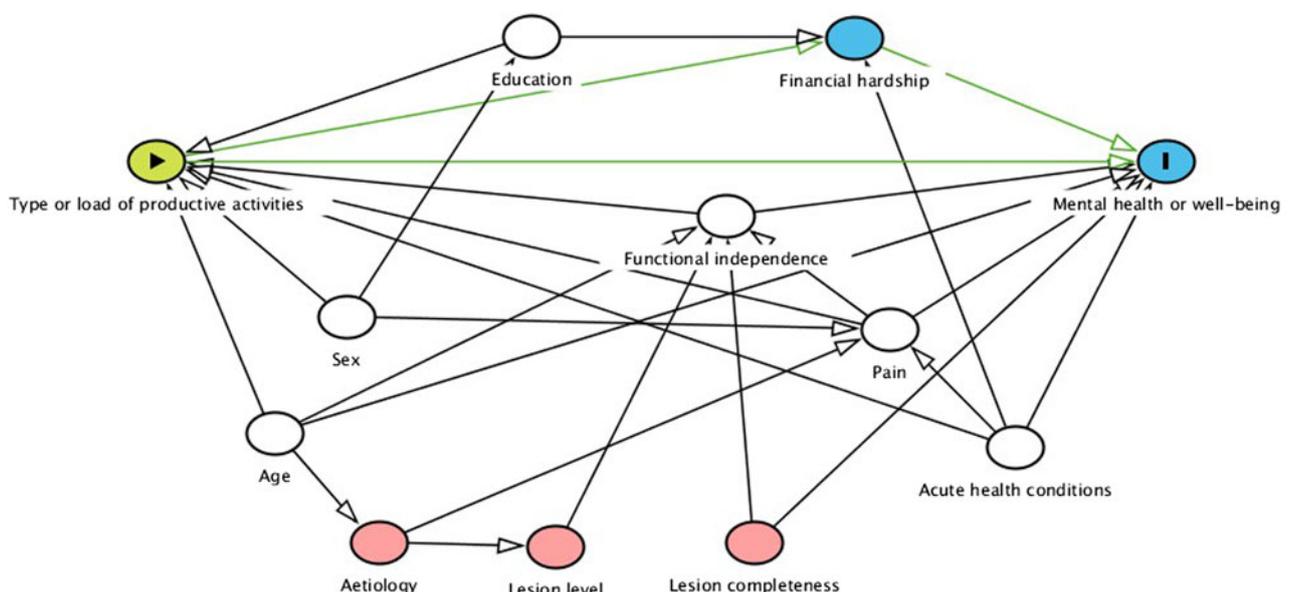


Figure 1. Directed acyclic graph (DAG) illustrating the interrelationships of variables of interest. Selection of potential confounders based on the literature; drawn paths based on bivariable data analyses; white circles indicate adjusted variables; pink circles indicate variables that are not included as confounders as potentially biasing paths are fully blocked by other variables; financial hardship not included as it acts as partial mediator; green circle with triangle: exposure; blue circle with I: outcome.

Table 1. Basic characteristics of the SwiSCI baseline population 2012 in retirement age (n = 314).

[missing values]	N (%)	Mean (SD, IQR)
Sociodemographic and lesion characteristics		
Age in years [0]		71.7 (6.1, 67-75)
Male [0]	216 (68.8)	
Female	98 (31.2)	
Education in years [10]		12.7 (2.9, 11-14)
Lesion severity [2]		
Paraplegia incomplete	139 (44.6)	
Paraplegia complete	76 (24.4)	
Tetraplegia incomplete	76 (24.4)	
Tetraplegia complete	21 (6.7)	
Time since injury in years [11]		18.1 (15.8, 5-29)
Traumatic aetiology [1]	117 (37.4)	
Non-traumatic aetiology	196 (62.6)	
Functional independence, ^a range -5.4 - 3.5 [7]		0.6 (1.2, 0-1.3)
Pain during the last week [5]	226 (73.1)	
Secondary health conditions, range 0-42 [22]		13.5 (7.8, 8-18)
Type of productive activities		
Engaged in housework [9]	221 (72.5)	
Engaged in volunteering [0]	77 (24.5)	
Engaged in paid work [0]	35 (11.2)	
Combination of productive activities [9]		
No engagement	71 (23.3)	
Only housework	145 (47.5)	
No housework but volunteering or paid work	13 (4.3)	
Housework and volunteering or paid work	76 (24.9)	
Load of productive activities		
Productivity sumscore, range 0-15 [14]		1.9 (1.7, 1-3)
Lowest tertile (score 0)	71 (23.7)	
Middle tertile (score 1-2)	135 (45.0)	
Highest tertile (score ≥ 3)	94 (33.3)	
Number of productive activities [9]		1.2 (0.9, 0-2)
None	71 (23.3)	
One	153 (50.2)	
Two or three	81 (26.6)	
Mental health and well-being		
Well-being, range 0-20 [0]		13.1 (3.6, 11-16)
General mental health, range 0-100 [40]		73.8 (18.1, 60-88)
Self-reported depression [0]	58 (18.5)	

Abbreviations: IQR: Inter-quartile range m: Missing values; SD: Standard deviation.

^a Indicated as Rasch-based scores of the Spinal Cord Independence Measure for Self-Report (Proding et al., 2016)

indicator for variance attributable to missing data. In FMI tests, it is assumed that the between-imputation variance is proportional to the within-imputation variance and subsets of variables are tested for significance by jointly testing whether coefficients equal zero (Li, Raghunatan, & Rubin, 1991). Statistical significance of categorical variables was evaluated by global tests. *P*-values <0.05 were taken as support against the null hypothesis indicating that there is no association between the variables of interest.

Results

Roughly two thirds of the sample were men, mean age was about 72 years and mean education about 13 years. Paraplegia was the most prevalent diagnosis and nearly two thirds of injuries had a non-traumatic cause. On average, people lived 18 years with SCI. Around three quarters of persons indicated engagement in housework, one quarter engagement in volunteering, and 10% engagement in paid work. While around 23% of participants were not engaged in any productive activity, 48% were only engaged in housework, 4% in volunteering or paid work but not in housework, and 25% in housework as well as volunteering or paid work. The average sumscore of productivity was 1.9 and one third of participants indicated a score of 3 or more. On average, persons indicated engagement in 1.2 activities, with 50% indicating engagement in one activity and 27% in two or three activities. The mean score of well-being was as 13.1 and of mental health 73.5.

The prevalence of self-reported depression was 18.5% (Table 1).

Crude associations

While engagement in housework and volunteering was consistently linked to better general mental health, lower prevalence of depression and better well-being, results for paid work were less consistent. Persons engaged in any other activity than housework reported better general mental health, better well-being and lower prevalence of depression than persons who were not engaged or only engaged in housework. The productivity load was positively associated with general mental health and well-being, and negatively related to the prevalence of depression (Table 2).

Adjusted associations

Persons engaged in volunteering reported better well-being compared to persons reporting no volunteering, however, associations of volunteering with general mental health and depression were less pronounced. Engagement in housework or paid work was not related to the outcomes. Persons engaged only in housework reported better well-being and lower prevalence of depression than non-engaged persons, however, the highest well-being and the lowest prevalence of depression were observed in persons

Table 2: Crude associations of type and load of engagement in productive activities with general mental health, depression and well-being.

	General mental health (0-100)		Depression (1; 0)		Well-being (0-20)	
	Mean (SD)	<i>p</i> -values	N (%)	<i>p</i> -values	Mean (SD)	<i>p</i> -values
Type of productive activities						
Housework		0.002 ^a		0.002 ^b		<0.001 ^a
Yes	74.9 (18.7)		32 (14.5)		13.5 (3.5)	
No	68.1 (19.4)		25 (29.8)		11.9 (3.5)	
Volunteering		0.007 ^a		0.077 ^b		<0.001 ^a
Yes	77.6 (15.8)		9 (11.7)		14.3 (3.3)	
No	71.6 (19.8)		49 (20.7)		12.8 (3.6)	
Paid work		0.074 ^a		0.109 ^b		0.006 ^a
Yes	77.3 (15.8)		3 (8.6)		14.5 (3.4)	
No	72.5 (19.4)		55 (19.7)		13.0 (3.6)	
Combination of productive activities		0.005, 0.002 ^c		<0.00 ^b		<0.001, <0.001 ^c
No engagement	67.5 (19.9)		23 (33.8)		11.3 (3.5)	
Housework only	73.3 (20.3)		23 (16.2)		11.3 (3.5)	
Other than housework	77.4 (15.7)		8 (9.2)		13.2 (3.6)	
Load of productive activities						
Productivity sumscore		0.002, <0.001 ^c		0.001 ^b		<0.001, <0.001 ^c
Lowest tertile (score 0)	68.7 (19.2)		24 (33.8)		11.4 (3.6)	
Middle tertile (score 1-2)	71.9 (20.1)		17 (12.6)		12.9 (3.6)	
Highest tertile (score >2)	78.8 (15.6)		16 (17.0)		14.6 (3.1)	
Number of productive activities		0.005, 0.001 ^c		0.001 ^b		<0.001, <0.001 ^c
None	68.7 (19.2)		24 (33.8)		11.4 (3.6)	
One	72.8 (20.0)		24 (15.7)		13.2 (3.5)	
Two or three	78.8 (14.7)		9 (11.1)		14.4 (3.2)	

^a*p*-value from Wilcoxon-Mann-Whitney test.^b*p*-value from chi-square test.^c*p*-values from Kruskal-Wallis test followed by Cuzicks test for trend across ordered groups.**Table 3:** Adjusted associations of type and load of engagement in productive activities with general mental health, depression and well-being.

Regression, effect size	General mental health		Depression		Well-being	
	Tobit, β (95% CI)	<i>p</i> -values	Logit, OR (95% CI)	<i>p</i> -values	Tobit, β (95% CI)	<i>p</i> -values
Scale	0-100		0;1		0-20	
Type of engagement						
No engagement	0.00		1.00		0.00	
Housework	4.01 (-0.63-8.65)	0.090	0.54 (0.25-1.17)	0.117	0.88 (-0.10-1.87)	0.077
Volunteering	3.99 (-0.57-8.55)	0.086	0.47 (0.19-1.17)	0.106	1.57 (0.64-2.50)	0.001
Paid work	-0.10 (-6.07-6.26)	0.975	0.38 (0.10-1.46)	0.161	1.17 (-1.28-0.38)	0.053
Combination of productive activities		0.201		0.018		<0.001
No engagement	0.00		1.00		0.00	
Only housework	2.99 (-2.14-8.11)		0.45 (0.20-1.02)		1.10 (0.04-2.14)	
Volunteering and/or paid work	5.29 (-0.47-11.05)		0.22 (0.08-0.64)		2.36 (1.17-3.55)	
Load of engagement						
Productivity sumscore		0.229		0.015		<0.001
Lowest tertile	0.00		1.00		0.00	
Middle tertile	3.15 (-1.86-8.17)		0.30 (0.13-0.71)		1.18 (0.13-2.24)	
Highest tertile	5.22 (-0.66-11.11)		0.63 (0.24-1.67)		2.44 (1.21-3.67)	
Number of productive activities		0.078		0.025		<0.001
None	0.00		1.00		0.00	
One	2.70 (-2.34-7.74)		0.42 (0.19-0.94)		1.19 (0.13-2.23)	
Two or three	6.69 (0.79-12.59)		0.24 (0.08-0.71)		2.42 (1.18-3.64)	

p-values from Equal-Fraction Missing Information Test. Missing values were imputed by multiple imputation. Models adjusted for age, sex, education in years, pain, secondary health conditions, and functional independence (see Figure 1).

Abbreviations: OR: Odds ratio; CI: Confidence interval.

engaged in volunteering or paid work. We detected non-significant trends towards better general mental health in persons engaged in volunteering or paid work compared to the household-only or the non-engagement group (Table 3). The productivity sumscore tertiles and the number of performed activities were both positively linked to well-being and negatively linked to depression. There was a tendency for persons with higher productivity load to report better general mental health ($p > 0.05$). Differences in general mental health remained insignificant even when comparing persons engaged in some activity and non-engaged persons (β 3.7, 95% CI -1.2 to 8.6; $p = 0.137$). Sensitivity analyses in which models for well-being were additionally adjusted for general mental health confirmed all results displayed in Table 3 (results not shown).

Discussion

This is one of the first studies analyzing associations of type and load of engagement in productive activities with mental health and well-being in a sample of older persons with a chronic physical disability, namely SCI. Although housework was the main type of performed activity, every fourth participant was engaged in volunteering, and every tenth participant in paid work. In line with our hypotheses, we found that volunteering was associated with higher well-being and observed that the load of productive activities was positively related to well-being and negatively related to the prevalence of depression. However, results did not confirm our hypothesis concerning the associations between productive activities and general mental health, nor for the associations of paid work and housework with the health outcomes.

This study provides evidence that volunteering relates to well-being in the context of aging with a disability. Volunteering may provide an opportunity to experience feelings of appreciation, reward, self-esteem, personal control and usefulness (Gruenewald et al., 2007; McMunn et al., 2009; Thoits & Hewitt, 2001; Wahrendorf et al., 2010) and these experiences in turn positively affect well-being. Our results for well-being are largely in line with findings from general elderly populations (Jenkinson et al., 2013), whereas depression was sensitive to the total load of productive activities only. Given the low prevalence of persons reporting a high load, we were unlike other studies (e.g., Jenkinson et al., 2013) not able to evaluate non-linearity or potential thresholds for the association of load of volunteering and depression or well-being. Notably, none of the health parameters studied were importantly affected by engagement in household activities, which might be explained by the limited gain resulting from social exchange (e.g., recognition, belonging) for these activities (Siegrist & Fekete, 2016).

In our population aging with disability, we found that the *load* of engagement in productive activities was related to better well-being and lower prevalence of depression. Our findings confirm the positive effect of productivity and well-being (Baker et al., 2005; Hao, 2008; Kim, 2013) and depression (Choi et al., 2013; Y. Li et al., 2014; Wahrendorf et al., 2008) observed in general aging populations and may indicate that the higher the load of productive engagement, the better the opportunities to experience appreciation, reward, self-esteem or personal control or feelings of usefulness (Gruenewald et al., 2007; McMunn et al., 2009; Thoits & Hewitt, 2001; Wahrendorf et al., 2010). Given that opportunities for social exchange and active contribution to the community are generally restricted in persons aging with a disability, our results indicate that persons who are able to overcome barriers for engagement profit from the positive effects on well-being and depression. Although the effect of productivity on belonging and social isolation is less explored, we assume that the positive effects of engagement are particularly enhanced in activities outside the home that reinforce social contacts and reduce feelings of isolation (e.g., volunteering, paid work). As loneliness and social isolation are highly prevalent in persons with disabilities (Tough, Fekete, Brinkhof, & Siegrist, 2017) and were observed as risk factors for reduced well-being and depression (Berkman & Glass, 2000; Tough et al., 2017), we maintain that the positive effects of productive engagement are partly explained by its power to reduce feelings of isolation and loneliness. Research in the context of aging and disability should further investigate the mediating role of loneliness or social isolation in the relationship between productivity, well-being and mental health to illuminate the underlying mechanisms of observed associations.

Whereas our findings indicate a positive association of productive activities with well-being and depression, this association was less evident for general mental health. While well-being is operationalized as general cognitive appraisal of the satisfaction with different life spheres, general mental health was operationalized by the SF-36 MHI-5, measuring the frequency of mood states during the past four weeks. Possibly, this evaluation is subject to short

term variations (i.e., related to acute health conditions), whereas well-being or the diagnosis of depression are more robust over time. The assumption that health conditions or pain had a strong impact on general mental health which weakened the direct association between productivity and general mental health is supported by the finding that their adjustment substantially reduced the strength of association. An alternative explanation maintains that the findings were mitigated by small sample size issues (Altman & Bland, 1995). Although confidence intervals indicated non-significant differences between productivity groups, the effects sizes remained considerably large (e.g., persons engaged in 2–3 activities: 6.7 points more on MHI-5 than non-engaged participants). Given that five points on the MHI-5 scale are considered as minimum clinically important difference (MCID) (J. Ware, Kosinski, & Gandes, 2005), the differences observed in our sample can be interpreted as rather pronounced.

Implications

Promoting the engagement in productive activities such as volunteering seems a valuable strategy to enhance well-being and reduce the prevalence of depression in persons aging with a physical disability. However, such a strategy would need to consider that the optimal load of productivity is individual and depends on a complex interplay of functional capacity, personal characteristics (e.g., self-efficacy), psychosocial resources (e.g., social network), and environmental factors, such as attitudes towards elderly persons or access to productive activities (Siegrist & Fekete, 2016). Targeted interventions might be effective in involving elderly people in productive activities, for example by strengthening personal and psychosocial resources, by reducing environmental barriers and by creating access to outside-home activities such as volunteer or small-load paid work positions. These personal and psychosocial resources may partly explain the observed associations of productivity with well-being and depression and further research on the mechanisms behind the identified associations is warranted in order to develop interventions that strengthen resources to enhance productivity in persons aging with a physical disability.

Strengths and limitations

This is the first study in the disability setting to investigate the association of engagement in three types of productive activities with mental health and well-being in an aging population. We were able to test our research questions in a population-based sample of persons with a physical disability of retirement age using sound epidemiological methodology. We applied state-of-the-art multivariable statistical methods, taking into account relevant confounders and potential bias due to item-nonresponse. Furthermore, all relevant constructs were measured with validated instruments.

Given the cross-sectional nature of this study, causality between engagement in productive activities and mental health or well-being cannot be inferred and we cannot exclude the possibility of reverse causation. The self-report nature of data might be another source of bias. While we

have good evidence on the validity of self-report lesion characteristics (Brinkhof et al., 2016), unmeasured confounding due to reporting bias in other variables might occur. For example, clinical assessments of secondary health conditions were not available and the self-report data might be biased by intrinsic personal characteristics, such as negative affectivity. Also, we were not able to evaluate the potential bias in self-reported hours of productive activities. Further, the sample used in this study was relatively small and a lack of conventional statistical significance might be a result of small sample size (Altman & Bland, 1995). For example, we observed large coefficients for associations of productive activities and general mental health, but also large confidence intervals.

Conclusion

This study in persons aging with disability provides support for the beneficial effects of engagement in productive activities, as volunteering was positively related to well-being and the load of engagement was related to well-being and reduced risk of depression. We conclude that strengthening the engagement in productive activities among persons aging with a chronic physical disability is a promising strategy to promote well-being and reduce the prevalence of depression in this potentially vulnerable group.

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Data availability statement

The dataset used and analysed in this study as well as study material such as questionnaires are available from the corresponding author upon request.

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