



Falls and subjective well-being. Results of the population-based German Ageing Survey



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ABSTRACT

Purpose: The aim of the current study was to determine the relationship between falling in the past 12 months and subjective well-being in a broader sense.

Methods: Cross-sectional data were gathered from a representative sample of community-dwelling individuals in the second half of life (40 to 95 years; $n = 7808$) in Germany. While life satisfaction was quantified using the Satisfaction with Life Scale (SWLS), positive and negative affect was measured using the Positive and Negative Affect Schedule (PANAS).

Results: The prevalence of falling in the preceding 12 months was 17.6%. After controlling for sociodemographic factors, various lifestyle factors, self-rated health, and morbidity, multiple linear regression analysis revealed that falling in the past 12 months was associated with higher negative affect ($\beta = 0.08$, $p < 0.001$), lower positive affect ($\beta = -0.04$, $p < 0.05$) as well as lower life satisfaction ($\beta = -0.12$, $p < 0.001$).

Conclusion: The present study stresses the relationship between falls and subjective well-being. Future longitudinal studies are needed to validate the findings of the present cross-sectional study and to better understand the nature of this relationship.

1. Introduction

Each year, more than 30% of community-dwelling older individuals experience a fall (Rubenstein, 2006). This proportion increases with age (Peel, Kassulke, & McClure, 2002). Falls are associated with numerous adverse health outcomes such as admission to nursing home, poorer functioning, morbidity and mortality among older adults (Hajek et al., 2015; Rao, 2005). Furthermore, due to demographic shifts, falls are an increasing health concern, including considerable medical and economic consequences (Ganz, Bao, Shekelle, & Rubenstein, 2007; Murray et al., 2013).

While the majority of falls results in no severe physical injury, the mental and functional consequences can hardly be overemphasized (Rubenstein, Josephson, & Robbins, 1994). Falls can cause, e.g., loss of self-esteem, or activity avoidance (Cumming, Salkeld, Thomas, & Szonyi, 2000; Scheffer, Schuurmans, Van Dijk, Van Der Hoof, & De Rooij, 2008; Suzuki, Ohyama, Yamada, & Kanamori, 2002). Furthermore, several studies have found that falls are positively associated with depression or depressive symptoms (Biderman, Cwikel, Fried, & Galinsky, 2002; Downton & Andrews, 1991; Reyes-Ortiz, Al Snih, & Markides, 2005; Sai, Gallagher, Smith, & Logsdon, 2010). Moreover, a recent meta-analysis has demonstrated that falls are

associated with anxiety (Hallford, Nicholson, Sanders, & McCabe, 2016). In addition, it has recently been shown that falls are associated with *health-related* quality of life (Huang, Lytle, Miller, Smith, & Fredrickson, 2014; Kronzer et al., 2016; Nicolussi et al., 2012; Pandya et al., 2016). However, thus far, little is known about the relationship between falling and *subjective well-being* (SWB) (Stenhagen, Ekström, Nordell, & Elmståhl, 2014). For example, one recent prospective study over six years in the South of Sweden (county Region Skane; $n = 1321$, aged 60–93 years; two waves) found that fallers ($n = 113$) had a notable lower score in life satisfaction (life satisfaction index A) compared to non-fallers ($n = 1208$) (Stenhagen et al., 2014).

Health-related quality of life and SWB are two distinct constructs (Kelley-Gillespie, 2009). Health-related quality of life mainly refers to individuals' health, whereas SWB refers to the question how individuals *think* and *feel* about their lives and therefore has *two* core components. While life satisfaction refers to the cognitive evaluation of life as a whole (Diener, 2000) (cognitive well-being, CWB), affective well-being (AWB) refers to the experience of positive (e.g., enthusiasm) (PA) as well as negative affects (emotions such as sadness) (NA). It is worth emphasizing that CWB and AWB are different constructs and differ, e.g., in their stability over time (Eid & Diener, 2004) and their correlates (Kahneman & Deaton, 2010).

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Therefore, using a large, representative sample of community-dwelling individuals in the second half of life (aged 40 years and above) in Germany, the aim of this study was to examine the relationship between falls in the past 12 months and SWB in a broader sense. Identifying such a relation might stress the relation between falls and SWB. This is important because SWB is a desirable goal for nations as it generates beneficial societal outcomes (Diener, 2006; Lyubomirsky, King, & Diener, 2005). For example, SWB contributes to health and longevity (Diener & Chan, 2011).

In accordance with the findings of Stenhagen et al. (Stenhagen et al., 2014), we hypothesize that (1) falls are negatively associated with CWB. Equally, we hypothesize that (2) falls are negatively related to AWB which means that falls are associated with (2a) increased negative affect and (2b) decreased positive affect.

These hypothesized relationships might be explained by the fact that falls can lead to, e.g., withdrawal from physical as well as social activities (Tinetti & Williams, 1998). Consequently, falls can seriously reduce the perceived autonomy of individuals (Roe et al., 2008; Vellas, Cayla, Bocquet, De Pemille, & Albarede, 1987), a fundamental psychological need (Deci & Ryan, 2000; Roe et al., 2008; Vellas et al., 1987). Typically, perceived autonomy is mainly defined as the experience of choice (Ryan & Deci 2006). These factors are in turn related to AWB as well as CWB (Calvo, Zheng, Kumar, Olgiati, & Berkman, 2012; Hajek & König, 2016; Hyde, Wiggins, Higgs, & Blane, 2003). For example, it has been suggested that the fulfillment of autonomy needs is likely to enhance individual's feelings of SWB (Tay & Diener, 2011).

Another explanation might be that falls are strongly associated with fear of falling and it has recently been demonstrated that fear of falling is associated with decreased CWB among community-dwelling older adults in Korea (Oh, Hong, Lee, & Han, 2015).

As for AWB, a qualitative study has shown that individuals suffering from a fall experienced a variety of emotions including pain, shock, anger, blaming themselves for the fall, or feelings of loneliness and fear (Roe et al., 2008). Moreover, it has been shown that falls are associated with decline in vigor (Brody, Kleban, Moss, & Kleban, 1984). Both, PA and NA, are, for example, associated with feelings of fear or vigor (Costa & McCrae, 1980). Thus, it appears plausible that experiencing a fall is associated with decreased AWB.

2. Methods

2.1. Sample

Data used in the present study were from the German Ageing Survey (Deutscher Alterssurvey, DEAS). DEAS is a longitudinal cohort-based survey of community-dwelling older adults aged 40 and over in Germany, beginning in 1996 (first wave). Data for DEAS were also collected in 2002 (second wave), 2008 (third wave), 2011 (fourth wave) and 2014 (fifth wave). The follow-up waves comprised panel samples and cross-sectional samples. While the panel samples included individuals who had already taken part before, the cross-sectional samples solely included individuals taking part for the first time. The response rates for the panel sample was 61% in 2014 and it was 25% for the cross-sectional sample. In total, the response rates of the German Ageing Survey are similar compared to other surveys conducted in Germany (Neller 2005). Please see Klaus and Engstler for further details concerning DEAS (Klaus & Engstler, 2016). For the present study, data were derived from the fifth wave because falls were not assessed in former waves. In total, $n = 7808$ individuals took part in the study and delivered data on falls. Written informed consent was obtained from all participants.

The German Ageing Survey complies with the Federal Data Protection Act. It is worth noting that an ethical statement for this study was not necessary because criteria for the need of an ethical statement were not met (risk for the respondents, lack of information about the aims of the study, examination of patients). Invasive methods, for

instance, were not used.

2.2. Dependent variables

PA and NA was assessed using the well-established positive affect and negative affect schedule (PANAS) (Watson, Clark, & Tellegen, 1988). This scale comprises ten positive and negative feelings each and asks participants to state whether they experience these feeling (1 = "very slightly or not at all", 2 = "a little", 3 = "moderately", 4 = "quite a bit", or 5 = "extremely"). Both scales can range from one to five, with higher values reflecting higher PA or NA, respectively. Cronbach's alpha for the PANAS was 0.87 in our study.

The Satisfaction with Life Scale (SWLS) (Pavot & Diener, 1993) was used to quantify CWB, consisting of five questions about life satisfaction (with five levels per item: 1 = "strongly agree", 2 = "agree", 3 = "neither agree nor disagree", 4 = "disagree", and 5 = "strongly disagree"). The scale ranges from one to five, with higher values reflecting higher CWB. In the present study, Cronbach's alpha was 0.86.

2.3. Independent variables

Individuals reported whether they experienced a fall in the past 12 months (no; yes), which is a common way of quantifying falls history (Catalá, Woitalla, & Arampatzis, 2015; Duncan et al., 2015; Teno, Kiel, & Mor, 1990). In addition, age, gender, marital status (married, living together with spouse; others (married, living separated from spouse; single; divorced; widowed), and individual monthly net equivalent income (OECD scale) were included as explanatory variables. In addition, smoking behavior (daily smoker; casual smoker; former smoker; non-smoker), alcohol consumption and frequency of sports activities (both with the categories: 'never', 'rarer than once a month', 'one to three times a month', 'once a week', 'several times a week', and 'daily') was used. Self-reported height (meter) and weight (kg) was used to compute body mass index (BMI) as weight divided by height-squared. Moreover, the number of chronic illnesses (cardiac and circulatory disorders; bad circulation; joint, bone, spinal or back problems; respiratory problems, asthma, shortness of breath; stomach and intestinal problems; cancer; diabetes; gall bladder, liver or kidney problems; bladder problems; insomnia; eye problems, vision impairment; ear problems, hearing problems; other illnesses or health problems) was included as independent variables.

In additional analysis, our main models were extended by adding depression and physical functioning as covariates. Depression was quantified using the Center for Epidemiologic Studies-Depression Scale (Radloff, 1977) with a cutoff of CES-D ≥ 18 (Lehr, Hillert, Schmitz, & Sosnowsky, 2008). Physical functioning was assessed using the subscale "Physical functioning" of the SF-36 (Ware & Sherbourne, 1992), ranging from 0 (worst score) to 100 (best score).

2.4. Statistical analysis

Bivariate associations between falls and the other variables were tested using independent *t*-tests as well as chi square tests, as appropriate. Furthermore, multiple regressions were performed to determine the relationship between falls and SWB (CWB and AWB (PA and NA)), adjusting for various potential confounders. In all regressions, we tested for multicollinearity using the variance inflation criterion and found that the largest variance across all regressions was 3.16, suggesting that we do not have a problem with multicollinearity. Moreover, the White test for heteroscedasticity in the error distribution was computed. In all regressions, the test statistics (with CWB as outcome measure: White's general test statistic = 555.3, $p < 0.001$; with PA as outcome measure: 351.6, $p < 0.001$; with NA as outcome measure: 462.7, $p < 0.001$) lead to the rejection of the null hypothesis of homoscedasticity. Consequently, robust standard errors were computed. The level of statistical significance was set to 0.05. All statistical analyses

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