



UNIVERSITY OF LEEDS

This is a repository copy of *Which financial stressors are linked to food insecurity among older adults in the United Kingdom, Germany, and the Netherlands? An exploratory study.*

White Rose Research Online URL for this paper:

<https://eprints.whiterose.ac.uk/177477/>

Version: Accepted Version

Article:

Loibl, C, Bruine de Bruin, W, Summers, B orcid.org/0000-0002-9294-0088 et al. (2 more authors) (2022) Which financial stressors are linked to food insecurity among older adults in the United Kingdom, Germany, and the Netherlands? An exploratory study. *Food Security*, 14 (2). pp. 533-556. ISSN 1876-4517

<https://doi.org/10.1007/s12571-021-01206-3>

© 2021, International Society for Plant Pathology and Springer Nature B.V. This is an author produced version of an article published in *Food Security*. Uploaded in accordance with the publisher's self-archiving policy.

Reuse

Items deposited in White Rose Research Online are protected by copyright, with all rights reserved unless indicated otherwise. They may be downloaded and/or printed for private study, or other acts as permitted by national copyright laws. The publisher or other rights holders may allow further reproduction and re-use of the full text version. This is indicated by the licence information on the White Rose Research Online record for the item.

Takedown

If you consider content in White Rose Research Online to be in breach of UK law, please notify us by emailing eprints@whiterose.ac.uk including the URL of the record and the reason for the withdrawal request.



eprints@whiterose.ac.uk
<https://eprints.whiterose.ac.uk/>

1 **Which financial stressors are linked to food insecurity among older adults**
2 **in the United Kingdom, Germany, and the Netherlands? An exploratory study**

3
4 **Abstract (250 words max)**

5 Food insecurity among adults age 65 and older is a growing public policy concern in European
6 countries, but the extent of the problem and the related financial stressors are unclear. The
7 purpose of this paper is to measure the percent of food insecure individuals in a targeted sample
8 of financially fragile older adults, and to identify associated financial stressors and socio-
9 economic characteristics. This exploratory study is based on an online survey of 1,059 older
10 adults experiencing financial hardship. Participants were recruited through commercial consumer
11 panels in the United Kingdom, Germany, and the Netherlands. The proportion of financially
12 fragile older adults reporting food insecurity ranged from 24% in the British sample, 29% in the
13 German sample, and 35% in the Dutch sample. We identified financial stressors that contributed
14 to food insecurity in each country sample. Having more financial stressors increased the risk of
15 food insecurity, which was similar in each country. Within and across country samples, food
16 insecurity is associated with financial stressors. Insights for policy makers, consumer advocates,
17 and social services point to the value of integrating financial and food-related support services,
18 the potential for cross-country collaboration, and efforts that take into account the particular
19 financial circumstances of older adults. (200 words)

20 **Keywords:** Germany, United Kingdom, Netherlands, Food insecurity, Older adults, Financial
21 stressors

22 **Running page title:** Financial stressors and food insecurity among older adults
23

24 **Title page**

25 **Names of the authors**

26 Cäzilia Loibl
27 Wändi Bruine de Bruin
28 Barbara Summers
29 Simon McNair
30 Pieter Verhallen

31
32 **Title**

33 Which financial stressors are linked to food insecurity among older adults in the United
34 Kingdom, Germany, and the Netherlands? An exploratory study

35
36 **Affiliations and addresses of the authors**

37 Cäzilia Loibl
38 Department of Human Sciences, The Ohio State University, 1787 Neil Avenue, Columbus, Ohio,
39 43210, USA, <https://orcid.org/0000-0002-7586-3295>

40
41 Wändi Bruine de Bruin
42 Sol Price School of Public Policy, Dornsife Department of Psychology, Schaeffer Center for
43 Health Policy and Economics, and Center for Economic and Social Research
44 University of Southern California, 635 Downey Way, Los Angeles, California, 90089, USA
45 <https://orcid.org/0000-0002-1601-789X>

46
47 Barbara Summers
48 Centre for Decision Research, Leeds University Business School, University of Leeds, Leeds
49 LS2 9JT,
50 United Kingdom, <https://orcid.org/0000-0002-9294-0088>

51
52 Simon McNair
53 Behavioural Insights Team, 4 Matthew Parker Street, London, SW1H 9NP, United Kingdom
54 United Kingdom, <https://orcid.org/0000-0003-3111-234X>

55
56 Pieter Verhallen
57 School of Business and Economics, Maastricht University, Tongersestraat 53, 6211 LM
58 Maastricht, The Netherlands, <https://orcid.org/0000-0003-4020-5484>

59
60 **E-mail address, and telephone number(s) of the corresponding author**

61 Cäzilia Loibl: Email loibl.3@osu.edu, phone +1 614 292 4226

62
63 **Acknowledgements**

64 The authors gratefully acknowledge a Marie Curie International Incoming Fellowship from the
65 Marie Curie Actions of the European Commission, Research Executive Agency (FP7-PEOPLE-
66 2012-IIF #330462, Bruine de Bruin, Loibl), generous funding from the Leeds University
67 Business School's Center for Decision Research (Bruine de Bruin, Loibl), and an Early Career
68 Fellowship of The Leverhulme Trust, U.K. (McNair).

69 **Which financial stressors are linked to food insecurity among older adults in the United**
70 **Kingdom, Germany, and the Netherlands? An exploratory study**

71
72

73 **1 Introduction**

74 Food insecurity is defined as not having regular access to enough safe and nutritious food for an
75 active and healthy life (Upton et al. 2016; FAO 2014). People who are food insecure are more
76 likely to report unhealthy eating, diabetes, and other chronic diseases, as well as social isolation
77 and depression (Lyles et al. 2014; Seligman et al. 2010; Seligman et al. 2012; Hawkey and
78 Cacioppo 2007). Food security has been conceptualized as resting on four hierarchical pillars: (1)
79 availability of sufficient food, (2) access to the available food given budgets and resources, (3)
80 utilization or the dietary quality of the accessible food individuals eat, and (4) stability of quality
81 food over time (Upton et al. 2016). In developed countries, food availability is typically met by
82 agricultural production, so access failures over time have been the key focus for social science
83 research on food insecurity (Upton et al. 2016; Barrett 2010). Generally, individuals with income
84 levels below the poverty line are at higher risk for food insecurity, because financial resources
85 are needed to afford consistent access to available food (Coleman-Jensen et al. 2017; FAO
86 2016).

87 When food insecurity increases in a population, studies in the United States show that the
88 trend is typically stronger among older adults (Coleman-Jensen et al. 2017). Across the 28
89 European Union countries, about 17.3% of older adults are at risk of food insecurity due to living
90 in poverty, defined as having less than 60% of the median income after accounting for pension
91 payments, household size, and composition (Eurostat 2016). Despite the prevalence of poverty in

92 older Europeans, the topic of financial vulnerability in retirement has only been publicly
93 addressed recently (van Rooij et al. 2011). Only a small number of recent studies point to the
94 growing problem of food insecurity in European countries (Loopstra et al. 2016; Borch and
95 Kjærnes 2016a; Vandentorren et al. 2016), with few focused on aging populations (Smith et al.
96 2018; Purdam and Esmail 2019).

97 A review of the literature of the past 20 years, since the year 2000, finds about 100
98 quantitative and qualitative journal articles on food insecurity among older adults. The majority
99 of these studies are conducted in the United States and Canada; for key literature see Appendix
100 Table 1. Overall, the findings of these studies fit the framework of an economically-focused
101 stress process model (Rona-Tas and Guseva 2018; Drentea and Reynolds 2015). That is,
102 economically disruptive events can result in changes in income (Pearlin et al. 1981), which, in
103 turn, contribute to economic strain that may be characterized by food insecurity (Yelowitz 2017;
104 Loopstra 2018). Figure 1 summarizes the five groups of financial stressors that these studies
105 have associated with food insecurity in older age.

106 First, income-related financial stressors in older age include the transition from work to
107 retirement and the ability to work during retirement (Niedzwiedz et al. 2015; Ayton et al. 2020).
108 Older adults have been shown to report higher food insecurity if they had low individual and
109 family income or income close to the poverty level in the past (Wang et al. 2015; Pirrie et al.
110 2020) or lived on social security pension income only (Barker et al. 2019; Russell et al. 2014). In
111 contrast, individuals receiving financial support through cash transfers, such as public pension
112 payments, have been associated with lower food insecurity in Canadian studies (McIntyre et al.
113 2016).

114 Second, debt-related financial stressors predict food insecurity in older age (Keller et al.

115 2007). Indebtedness in older age is increasing because a growing number of older adults carry
116 mortgage debt into retirement (Joint Center for Housing Studies 2018), in addition to credit card
117 debt, auto loans, and other means of unsecured borrowing. Such indebtedness results in liquidity
118 constraints, constraints on access to credit, and limited financial resources (Green-LaPierre et al.
119 2012; Keller et al. 2007), all of which have been shown to be related to food insecurity.

120 Third, housing-related financial stressors include increases in the cost of living and in the
121 cost of housing (Read et al. 2016). Older adults have been shown to be more likely to be food
122 insecure if they do not own a home (Russell et al. 2014; Vargas Puello et al. 2013); or are
123 waitlisted for public housing programs, as compared to those accepted into such programs
124 (Carder et al. 2016); or those who were recently homeless (Wang et al. 2015); lacked
125 transportation (Wolfe et al. 2003); or lived in larger households (Vargas Puello et al. 2013).

126 Fourth, family-related financial stressors include the expense and income shocks
127 associated with separation, divorce, or death of a spouse or partner. Studies show that living in a
128 partnership is associated with lower food insecurity (Park et al. 2019). Other social factors
129 associated with higher food insecurity in older age are having a smaller social network (Johnson
130 2013) and social isolation (Burriss et al. 2019).

131 Fifth, health-related financial stressors that can affect food insecurity in older age include
132 medical costs. Studies in the United States show, for example, that taking three or more
133 prescription drugs is related to higher food insecurity (Bengle et al. 2010). In several studies,
134 cost-related medication non-adherence has been related to food insecurity in older age (Caouette
135 et al. 2020), as has poor management of costly chronic diseases, such as hypertension, diabetes,
136 HIV, and depression (Wang et al. 2011; Wang et al. 2015) and functional limitations (Wolfe et
137 al. 2003).

138 In addition to these financial stressors, demographic and social characteristics have been
139 associated with higher access-related food insecurity in older age. These characteristics include
140 being female (Russell et al. 2014; Dean et al. 2011); having been born in a developing country
141 (Sharkey et al. 2011); having African American or other minority status (Dean et al. 2011; Wang
142 et al. 2015); being too young (e.g., under 70) to qualify for welfare transfers (Miller et al. 2020;
143 Park et al. 2019; Russell et al. 2014; Bengle et al. 2010); and having lower educational
144 attainment (Bengle et al. 2010; Grammatikopoulou et al. 2019).

145

146 **1.1. The present study**

147 In the present study, we aim to understand food insecurity among financially fragile older adults
148 in three countries representing a range of pension systems in Europe: the United Kingdom,
149 Germany, and the Netherlands. These three countries are chosen because they represent distinct
150 pension systems in Europe. In the United Kingdom, personal savings and employer-based
151 pension systems play a significant role for many older adults, while governmental pensions
152 provide a smaller portion of income (about 50%), compared to 60% in the OECD countries
153 overall (Ayres and Cracknell 2015; Alonso-Fernandez et al. 2018). In Germany, personal savings
154 play an increasing role, especially for older adults with non-traditional employment histories
155 (Ziegelmeyer and Nick 2013). The Netherlands emphasizes the comprehensive financial security
156 it provides to its residents, including older adults with non-traditional careers (Disney 2016;
157 Heeringa and Bovenberg 2012).

158 Despite the social security net provided to older adults, poverty rates among older adults
159 aged 65 are 16.7% in the United Kingdom and Germany, and 11.6% in the Netherlands (Eurostat
160 2016), which may put them at risk of food insecurity. Consequently, understanding the

161 determinants of food insecurity in older age in European countries is an important area of
162 research. The reasons for food insecurity in older age found in the literature outside Europe,
163 however, may not generalize to European countries. Investigating whether and to what extent
164 these factors do apply in Europe is the overall goal of the current paper. The specific aims of this
165 paper are to identify the percentage of food insecurity among a targeted sample of financially
166 fragile older adults, assess which financial stressors are associated with food insecurity in the
167 country-specific samples, and investigate whether having more financial stressors increases the
168 risk of food insecurity. Specifically, we examine the following research questions (RQ):

169 *RQ1.* What percent of financially fragile older adult participants in our samples from the
170 United Kingdom, Germany, and the Netherlands is food insecure?

171 *RQ2.* Which financial stressors predict food insecurity in each of the three country samples?

172 *RQ3.* Does the contribution of financial stressors to food insecurity differ for financially fragile
173 older adults in the different country samples?

174 Figure 1 illustrates the hypothesized relationships between financial stressors and food insecurity
175 examined in the current study.

176 [Figure 1 about here]

177

178 **2 Methodology**

179 **2.1 Sample**

180 Participants were recruited through commercial online consumer panels of Research Now, a
181 large market research company in Europe. The company used its internal panels to collect survey
182 data in the United Kingdom and Germany, and a partner panel in the Netherlands. In addition to
183 internal panel participants, study participants were recruited through search engine advertising,

Financial stress and food insecurity among older adults

184 direct website advertising and partnership marketing to meet sample size targets (Piazza 2018).
185 Data collection occurred in three waves in Autumn 2015: October 5 to 12 in the United
186 Kingdom, October 14 to 22 in Germany, and October 29 to November 16 in the Netherlands.

187 To be eligible to participate in this study, an individual had to answer at least one of the
188 following screeners affirmatively, “I barely make ends meet and cannot save,” “I currently have
189 run up problem debt on, e.g., credit cards or overdrafts,” and “I have contacted a debt advice
190 agency in the past five years.” These screener questions were developed specifically for the
191 present study based on in-depth interviews with financially fragile older adults prior to the
192 survey. Recruitment was stratified by age (born after 1950 (excluded from survey), 1946-1950,
193 1941-1945, before 1940) and gender (50% men, 50% women), so as to recruit a diverse group of
194 financially fragile older adults (older and younger seniors, males and females). Still, it is likely
195 that older people living in significant poverty may not have been reached because they may not
196 have an internet connection, are not capable of using the technology, or do not have time to
197 participate in internet panels.

198 A total of 5,253 panel members aged 65 or older accessed the survey after receiving
199 invitation emails from the market research company, 1,571 individuals passed the screener
200 questions, and 1,072 completed the survey (358 in the United Kingdom and Germany each, 356
201 in the Netherlands). The response rate, conditional on passing the screener questions, was 66% in
202 the United Kingdom, 74% in Germany, and 66% in the Netherlands. The total sample for this
203 study consisted of 1,059 respondents who answered the food security questions.¹ Sample
204 characteristics are presented in Table 1.

¹ The target sample size of 1,067 was based on the population size of adults age 65 and older in 2015 (UK: 12 million, GER: 18 million, NL: 2.5 million), income poverty rate of this population as a proxy for food insecurity

205 **2.2 Procedure and measures**

206 Our survey questions focused on topics that were previously raised in in-depth interviews that we
207 conducted with 31 aging experts and 45 older adults in the three countries, following
208 recommended “mental models” survey design procedures (Morgan et al. 2002). To facilitate
209 respondents’ understanding of the survey questions, wording was taken from these interviews
210 (Bruine de Bruin and Bostrom 2013). The resulting survey was pre-tested by a handful of those
211 aging experts and older adults in the three countries.

212 The entire questionnaire was developed in English and then translated into German and
213 Dutch by the team of investigators, which included native speakers of both languages. The
214 survey consists of six sections and is presented in Appendix Table 2. Section 1 inquired about
215 money management behavior and had 31 items, including the measures of financial stressors.
216 Section 2 addressed respondents’ current financial situation and had 16 items, including the food
217 security measures. Sections 3 to 5, which inquired about interpersonal differences, health, and
218 debt responses, were not analyzed for the present paper. Section 6 inquired about socio-
219 economic characteristics and had 18 items. In the survey, the presentation of the 12 financial
220 stressors was randomized for each survey respondent. Randomization has been recommended to
221 avoid survey bias due to item ordering (Dillman et al. 2014). The sequence of the food security
222 items was not randomized because they were ordered by severity, and the sequence and response
223 options for the demographic questions were not randomized because they were grouped
224 according to topic.

(UK: 13.8%, GER: 9.5%, NL: 3.7 (OECD 2017)), a 95% confidence level, and a 3% margin of error (Dillman et al. 2014). The final sample size of 1,059 presented a 3.01% margin of error.

225 *Food insecurity* was measured using the standard survey instrument developed by the
226 Food and Agriculture Organization of the United Nations (FAO) and the U.S. Department of
227 Agriculture (Coleman-Jensen et al. 2017; FAO 2016). The instrument consisted of 10 items
228 asking about food insecurity over the past 12 months. Example items include “The food that I/we
229 bought just didn’t last, and I/we didn’t have money to get more. Was this statement often,
230 sometimes, or never true for you or your household in the last 12 months?” (response options:
231 often, sometimes, never true, don’t know, prefer not to answer) and “In the last 12 months, did
232 you ever eat less than you felt you should because there wasn’t enough money for food?”
233 (response options: yes, no, don’t know, prefer not to answer) with the follow-up question, “How
234 often did this happen?” (response options: almost every month, some months but not every
235 month, only 1 or 2 months, don’t know, prefer not to answer). These items covered the range of
236 circumstances in which older adults were deprived of healthy and nutritious food (Kenney 2008).
237 We coded food insecurity using the guidelines established by the U.S. Department of Agriculture
238 (Bickel et al. 2000), which is commonly used for older adult samples (Ziliak and Gundersen
239 2018).² Specifically, participants were categorized as “food insecure” (vs. “food secure”) if one
240 or more questions were answered with “often” or “sometimes” (vs. “never”) or “yes” (vs. “no”).

241 *Financial stressors* referred to recent financial shocks and were measured by a question
242 specifically developed for this study, “To what extent have the following caused you financial
243 difficulty in the past 12 months?” Response options included: (1) job loss; working fewer hours;
244 unable to work; (2) entering retirement; (3) death/separation/divorce of spouse/partner; (4) daily
245 cost of living; (5) housing costs; (6) medical costs due to illness, accidents, addiction; (7) cost of

² Other common cut-off points in the food insecurity literature are low and very low food security. Low food security is defined as three or more affirmative answers to the 10 food security questions and very low food security is defined as five or more affirmative answers (Coleman-Jensen et al. 2019).

246 at-home or institutional care; (8) debt from credit cards, consumer loans, mortgage; (9) debt from
247 failed business/self-employment; (10) debt from payday or short-term loans; (11) victim of
248 financial scams; and (12) financial support to family member. Responses were provided on a
249 five-point Likert scale ranging from “not at all” to “a great deal.” Missing values ranged from
250 2.5% (daily cost of living) to 5.6% (debt from payday or short-term loans) and were coded as “1”
251 (not at all). This approach was based on the assumption that study participants skipped questions
252 if they did not apply to them. It was more conservative than using multiple imputation and
253 simple means replacement. The 12 individual stressors were used in analyses for RQ1 and 2.
254 They were summed to a single measure for RQ3 (Cronbach’s $\alpha=0.86$).

255 *Socio-economic characteristics* were measured with standard measures adapted from
256 household surveys in the three countries, including the German Socio-Economic Panel (DIW
257 2019), the Dutch DNB Household Survey (Centerdata 2019), and the British Understanding
258 Society study (ISER 2019). These variables included gender (male=1, female=0); education
259 (post-secondary educational attainment=1, else=0); marital status (married or living with
260 partner=1, else=0); children (having had biological, step, or adopted children=1, else=0);
261 location of residence (urban or central city areas=1, suburban and rural residence=0); and
262 homeownership (owning a home=1, else= 0). Age was measured as a continuous variable and
263 monthly net income is measured with 14 categories (under 500 GBP/EUR=1, 15,000
264 GBP/EUR=14). Six of the eight socio-economic characteristics had missing values, ranging from
265 2.46% (education) to 4.82% (income). To preserve sample size across the different regression
266 analyses, missing values were replaced with the mean value and the missing values flagged with
267 an additional binary indicator variable. This indicator variable was coded as 1 if the value is

268 replaced with the mean and coded as 0 if the value was not missing (Acock 2005). The mean
269 value was calculated for each of the three countries separately to reduce imputation bias.

270 In the three-country sample, about 51% of respondents are male and the average age is 71
271 years (SD=4.0). About one-third completed post-secondary education (29%). The majority of
272 respondents are married or living with a partner (57%), have children (82%), live in rural areas
273 (53%), and own a home (52%). The average monthly net household income is 1,853 EUR/GBP
274 (25th percentile=750 EUR/GBP, 50th percentile=1,250 EUR/GBP, 75th percentile=2,250
275 EUR/GBP; SD=1,997 EUR/GBP). The income data are not normally distributed (Kolmogorov-
276 Smirnov goodness-of-fit test: $p < 0.001$; Shapiro-Wilk test for normality: $p < 0.001$). To provide
277 additional background information about our sample, study respondents report above mid-point
278 levels of frugality (mean=3.92 (SD=0.53), range: 1 to 5=high), propensity to plan for money
279 (mean=3.80 (SD=0.69), range: 1 to 5=high) and 80.0% of the sample show low or no tolerance
280 for debt. The average respondent answers three out of five financial literacy questions correctly.
281 Life satisfaction is rated at a mean of 2.94 (SD=0.74, range: 1 to 5=high), perceived stress at a
282 mean of 2.74 (SD=0.46, range: 1 to 5=high), loneliness at a mean of 2.23 (SD=0.795, range: 1 to
283 5=high), and 26% report depressive symptoms (SD=0.26).

284

285 **2.3 Analysis plan**

286 To investigate the percentage of financially fragile adults in our sample who were food insecure
287 (RQ1), means and standard deviations were calculated and chi-square statistic for tests of the
288 equality of the means were used to identify differences between countries. Next, in three binary
289 logistic regressions (RQ2), one for each country sample (EU_j, j=1 (UK), 2 (GER), 3 (NL)), we
290 predicted whether or not individuals (i) were food insecure (FI) from the 12 individual stressors

291 (S), with the eight socio-economic characteristics serving as controls (C). The regression
292 specification is of the form shown in Equation 1:

$$293 \quad \ln (P (EU_{ij})/(1-P (EU_{ij}))) = \beta_0 + \beta_1 S_i + \beta_2 C_i \quad (1)$$

294

295 The analysis of country-sample differences in the contribution of stressors to food insecurity
296 (RQ3) uses the full sample. Binary logistic regression is used to respond to the dichotomous
297 nature of the dependent variable, which is whether a respondent is food insecure or not. The
298 measure of food insecurity (FI) is regressed on the summed financial stressors (SI), binary
299 indicator variables of the three countries (EU_j , $j=1$ (UK), 2 (GER), 3 (NL, omitted)), and
300 interaction terms of country and summed financial stressors. The eight socio-economic
301 characteristics (C) serve as controls. The regression specifications are of the form shown in
302 Equation 2 (main effects model) and 3 (interaction model):

$$303 \quad \ln (P(FI_i)/(1-P (FI_i))) = \beta_0 + \beta_1 SI_i + \beta_2 EU_{ij} + \beta_3 C_i \quad (2)$$

$$304 \quad \ln (P(FI_i)/(1-P (FI_i))) = \beta_0 + \beta_1 SI_i + \beta_2 EU_{ij} + \beta_3 SI_i * EU_{ij} + \beta_4 C_i \quad (3)$$

305

306 To evaluate model fit in the regression analyses for RQ2 and RQ3, the omnibus chi-
307 square test of model coefficients and the Hosmer and Lemeshow test of model fit were
308 examined. Acceptable model fit is assumed if an omnibus chi-square test is significant at the
309 0.1% level and the Hosmer and Lemeshow test is insignificant ($p > 0.050$) (Meyers et al. 2017).
310 Significance of means comparisons and regression coefficients is evaluated at the 0.1%, 1%, and
311 5% level. If the 95% confidence interval of odds ratios includes the number 1, the odds ratios are
312 not considered statistically significant (Tenny and Hoffman 2020).

313

314 **3 Results**

315 **3.1 Percent food insecurity of financially fragile older adults in samples from the United**
316 **Kingdom, Germany, and the Netherlands**

317 Table 1 presents the descriptive statistics for all measures. Most importantly, the percent of
318 financially fragile older adult participants who self-reported being food insecure is 24.3% in the
319 British sample, 28.5% in the German sample, and 35.0% in the Dutch sample (N=310 of 1,059;
320 29.3% overall). Significant differences in food insecurity exist between the British and Dutch
321 respondents ($\chi^2(1)=9.8$, $p<0.010$). The mean differences between the German and Dutch
322 respondents (6.5 percentage points, $\chi^2(1)=3.5$, n.s.) and between the British and German
323 respondents are not significant (4.2 percentage points, $\chi^2(1)=1.6$, n.s.).³

324 [Table 1 about here]

325 To facilitate the interpretation of these findings, we compare our samples to country-
326 representative food security survey data of the FAO, which were collected from in the United
327 Kingdom, Germany, and the Netherlands in the year prior to the data presented here (FAO
328 2016). The FAO data include five demographic characteristics, gender, age, education, marital
329 status, and location of residence, but no financial measures. Despite our focus on financially
330 fragile older adults, the demographic characteristics are similar in the FAO and our own survey

³ Additional information on low or very low food security: A total of 16.9% of British, 11.6% of German, and 17.9% of Dutch respondents experience low or very low food security; a total of 6.8% of British, 3.7% of German, and 6.0% of Dutch respondents experience very low food security. When combining low and very low food security, as is common (Coleman-Jensen et al. 2019), the Dutch and British samples have similarly high percentages of low and very low food security ($\chi^2(2)=0.122$, $p=0.727$). The German sample reports 8.47 percentage points lower levels of low and very low food security versus the British ($\chi^2(1)=4.169$, $p=0.041$) and 8.68 percentage points lower versus the Dutch samples ($\chi^2(1)=5.681$, $p=0.017$). Regression results for low and very low food secure respondents are generally similar in direction to the presented results, but we detect fewer significant associations due to the smaller sample sizes.

331 data, except that the current study's German and Dutch samples are younger (GER: $t(590)=6.1$,
332 $p<0.001$; NL: $t(548)=4.5$, $p<0.001$) and the British sample is better educated compared to the
333 FAO country-representative sample ($\chi^2(1)=8.0$, $p<0.050$). The analysis of FAO's country-
334 representative data indicates food insecurity of 18.78% in the United Kingdom, 3.65% in
335 Germany, and 10.50% in the Netherlands, among those 65 years and older ($N_{UK}=199$, $N_{GER}=238$,
336 $N_{NL}=199$; weighted). Means comparison tests show significant differences between the FAO and
337 our financially fragile German sample ($\chi^2(1)=60.0$, $p<0.001$) and Dutch sample ($\chi^2(1)=43.1$,
338 $p<0.001$), but not for the British sample ($\chi^2(1)=2.9$, n.s.). In fact, our financially fragile German
339 and Dutch samples are, respectively, about 8.4 times ($=28.5\%/3.4\%$) and 3.6 times
340 ($=35.0\%/9.6\%$) more likely to be food insecure, compared to the FAO country-representative
341 samples.

342

343 **3.2 Financial stressors that predict food insecurity in each of the three country samples**

344 Table 2 presents the results of the country-specific regressions that predict food insecurity from
345 individual financial stressors. In each country sample, two financial stressors emerge as
346 significant predictors of food insecurity. Column 1 in Table 2 shows that, for the British sample
347 of financially fragile older adults, the odds of food insecurity are associated with costs of daily
348 living and care costs. For the German sample, Column 2 in Table 2 shows that the odds of food
349 insecurity are associated with medical costs, indebtedness, and income loss due to retirement.
350 For the Dutch sample, Column 3 in Table 2 shows that the odds of food insecurity are associated
351 with care costs and giving financial support to family members.

352

[Table 2 about here]

353

354 **3.3 Contribution of financial stressors to food insecurity in the different country samples**

355 Column 1 in Table three shows that participants with more financial stressors tend to be at
356 greater risk of food insecurity. Column 2 in Table 3 adds interactions with country dummies,
357 which were not significant. Thus, the number of financial stressors that lead to food insecurity do
358 not differ among the three country samples of financially fragile older adults.

359 [Table 3 about here]

360

361 **4 Discussion**

362 The current study responds to calls for a better understanding of food insecurity in European
363 countries (Purdam and Esmail 2019; Borch and Kjærnes 2016b). Our samples of older adults in
364 financial hardship were recruited from the United Kingdom, Germany, and the Netherlands. We
365 found that our samples included a relatively high percent of food insecure individuals, identified
366 specific financial stressors that contributed to food insecurity in each country, and revealed that
367 having more financial stressors similarly contributed to more food insecurity in each country.

368 Our samples were relatively high in food insecurity compared to FAO data for each
369 country, which is likely due to our samples including older adults in financial hardship. The
370 particularly high ratio of food insecurity in our German sample indicated that financial distress
371 was associated to a greater extent with food insecurity in the Germany sample than in the other
372 two country samples. It is a surprising finding. Food prices were about the same in Germany as
373 in the United Kingdom and the Netherlands (Eurostat 2018). Germany had about 930 food-
374 banks, the largest network in the three countries per capita (Tafel Deutschland 2018; The
375 Trussell Trust 2018; Statista 2017). Food assistance services, such as meals-on-wheels, were
376 available across Germany (Deutsche Gesellschaft für Ernährung 2012; Horlemann 2017), while

377 such services had been declining in the United Kingdom, with only about half of county councils
378 providing such services (National Association of Care Catering 2016). An explanation could be
379 found in the significant body of literature on emergency food relief, which identified it as the last
380 coping strategy to be deployed, due to the significant stigma associated with the use of support
381 services (Loopstra 2018). It could be that in Britain and the Netherlands, the use of foodbanks
382 has in some way been normalized, whereas in Germany it perhaps had not been similarly
383 accepted, thus presenting an avenue for future research (Pfeiffer et al. 2015; Loopstra and
384 Tarasuk 2015; Loopstra et al. 2018). Another explanation could be found in heterogenous access
385 to employment among adults age 65 and older in the three European countries. Eurostat data
386 from 2015 indicated that the employment rate for this age group was, at 6.1%, somewhat lower
387 in Germany among the three countries, compared to 7.0% in the Netherlands and 10.6% in the
388 United Kingdom (Eurostat 2019). It is an important avenue for future research to investigate the
389 food-related coping strategies for older adults who experience financial hardship.

390 The country-specific results for the second research question indicated the origin of food
391 insecurity for each country. In the British sample of financially fragile older adults, for example,
392 general cost of living was associated with food insecurity. This finding of the role of food costs
393 improves our understanding of one pathway between low income and food insecurity in older
394 age, as pointed out in earlier literature (Wang et al. 2015; Lee et al. 2015). The higher
395 comparative price level for general consumption in the United Kingdom (116.4%) compared to
396 the Netherlands (112.1%) and Germany (104.0%; EU28=100%) could explain this finding
397 (Eurostat 2017a), and it confirmed insights from a recent qualitative study in the United
398 Kingdom (Purdam and Esmail 2019) and research on the role of price-reduced meals in the
399 United States (Diallo et al. 2020). In the German sample of financially fragile older adults,

Financial stress and food insecurity among older adults

400 medical costs were a predictor of food insecurity, confirming government statistics about high
401 out-of-pocket expenditures in Germany, which were 12.2%, compared to 6.0% in the
402 Netherlands, for example (Eurostat 2017b). The role of medical costs has also been confirmed in
403 other cross-country studies (Penders et al. 2017) and in the U.S. American and Canadian
404 literature (Caouette et al. 2020). In the Dutch sample of financially fragile older adults, health
405 care costs were associated with food insecurity, aligning with recent reports about the country's
406 high ranking in the OECD in terms of health care spending, particularly in older age (Bakx et al.
407 2016). Future research with longitudinal data is needed to examine the causality of the
408 associations and their strength over time.

409 The findings for the third research question suggest that in each country sample the
410 number of financial stressors similarly increased the risk of food insecurity. The number of
411 financial stressors was the sum of the 12 individual stressors included in the analyses for
412 Research Question 2. Possibly, while financial stressors may differ for each individual, food
413 insecurity may be experienced to a similar extent as financial stressors mount. This result is not
414 uncommon in food insecurity research. It reflects research that emphasizes food insecurity as a
415 result of the cumulation of hardship situations (Hernandez 2015; Hernandez et al. 2019;
416 Barrafreem et al. 2021). Our finding also reflects the fact that similar percentages of food
417 insecurity have been shown in different population groups despite dissimilar sets of financial
418 stressors. For example, in the United States, the food security of women living alone is at about
419 13% similar to the percentage reported for households with children (Coleman-Jensen et al.
420 2020), even though both population groups may not share the same financial stressors. Future
421 research should focus on developing both general and population-group specific financial
422 stressors to identify common and unique hardship situations.

423 Limitations of the study need to be noted. First, this exploratory research uses samples
424 that are not necessarily representative of the general population of older adults in the United
425 Kingdom, Germany and the Netherlands. Specifically, we recruited older adults experiencing
426 financial hardship. A comparison with FAO data nevertheless found similarities in terms of the
427 food insecurity in the United Kingdom. Second, the sample sizes were relatively small with a
428 total of 310 food insecure study participants in the three-country sample. It is possible that lack
429 of power prevented this exploratory study from identifying all significant relationships.
430 However, the sample size calculation is based on a 95% confidence level and a reasonable 3.01%
431 margin of error. Third, the web-based data collection efforts limit participation to individuals
432 who were panel members and had online access. It is likely that older people living in significant
433 poverty may not have been reached because they may not have an internet connection, are not
434 capable of using the technology, or do not have time to participate in internet panels. Future
435 research should be designed to address these limitations, by collecting larger and representative
436 sample sizes in each country, and using different data collection platforms.

437

438 **5 Implications for policy makers**

439 The current study is among the first to examine food insecurity among older adults in western
440 European countries who are experiencing financial hardship. The results point to three main
441 insights for policy makers, consumer advocates, and social services. First, the finding that
442 financial stress is closely associated with food insecurity in older age suggests value in
443 integrating financial and food-related support services. An example is to integrate financial
444 advice at food banks, which has been pilot-tested in the United Kingdom (Jones 2016). Second,
445 the finding that the association of cumulative financial stressors and food insecurity is similar

446 across the three countries points to the value of collaboration between the current study’s highly
447 developed countries in order to measure and identify solutions for food insecurity in older age.
448 Third, interventions aimed at relieving food insecurity among older adults should take into
449 account the unique characteristics of this population group, such as age-related barriers to
450 obtaining earned income, access to borrowing, and competing health-related expenditures.
451 Fourth, the study indicates the need for robust data collection and reporting on the food
452 insecurity of older adults, similar to the annual “State of Senior Hunger in America” studies in
453 the United States (Ziliak and Gundersen 2020).

454

455 **Conflict of Interest**

456 The authors declared that they have no conflict of interest.

457

458

459 **References**

- 460 Acock, A. C. (2005). Working with missing values. *Journal of Marriage and Family*, 67, 1012-
461 1028.
- 462 Alonso-Fernandez, J.-J., Meneu-Gaya, R., Devesa-CarpioMar, E., Devesa-Carpio, Dominguez-
463 Fabian, I., & Encinas-Goenechea, B. (2018). From the replacement rate to the synthetic
464 indicator: A global and gender measure of pension adequacy in the European Union.
465 *Social Indicators Research*, 138(1), 165-186.
- 466 Ayres, S., & Cracknell, R. (2015). *Pensions: International comparisons* (Standard Note:
467 SN/SGS/00290; 24 February): U.K. House of Commons, Social & General Statistics
468 Section.
- 469 Ayton, P., Bernile, G., Bucciol, A., & Zarri, L. (2020). The impact of life experiences on risk
470 taking. *Journal of Economic Psychology*, 79, 102274, doi:10.1016/j.joep.2020.102274.
- 471 Bakx, P., O'Donnell, O., & Doorslaer, E. v. (2016). Spending on health care in the Netherlands:
472 Not going so Dutch. *Fiscal Studies*, 37(3-4), 593-625.
- 473 Barker, M. E., Halliday, V., Mak, D., Wottge, M., & Russell, J. M. (2019). Food security,
474 nutrition and health of food bank attendees in an English city: A cross-sectional study.
475 *Journal of Hunger & Environmental Nutrition*, 14(1-2), 155-167.
- 476 Barrafreem, K., Västfjäll, D., & Tinghög, G. (2021). The arithmetic of outcome editing in
477 financial and social domains. *Journal of Economic Psychology*, 86(October), 102408.
- 478 Barrett, C. B. (2010). Measuring Food Insecurity. *Science* 327(5967), 825-828.
- 479 Bengle, R., Sinnott, S., Johnson, T., Johnson, M. A., Brown, A., & Lee, J. S. (2010). Food
480 insecurity is associated with cost-related medication non adherence in community-
481 dwelling, low-income older adults in Georgia. *Journal of Nutrition for the Elderly*, 29(2),
482 170-191.
- 483 Bickel, G., Nord, M., Price, C., Hamilton, W., & Cook, J. (2000). *Guide to measuring household*
484 *food security* (Measuring food security in the United States). Alexandria: United States
485 Department of Agriculture; Food and Nutrition Service; Office of Analysis, Nutrition,
486 and Evaluation.
- 487 Borch, A., & Kjærnes, U. (2016a). Food security and food insecurity in Europe: An analysis of
488 the academic discourse (1975-2013). *Appetite*, 103, 137-147.
- 489 Borch, A., & Kjærnes, U. (2016b). The prevalence and risk of food insecurity in the Nordic
490 region: Preliminary results. *Journal of Consumer Policy*, 39(2), 261-274.
- 491 Bruine de Bruin, W., & Bostrom, A. (2013). Assessing what to address in science
492 communication. *PNAS*, 110(Suppl. 3), 14062-14068.
- 493 Burris, M., Kihlstrom, L., Arce, K. S., Prendergast, K., Dobbins, J., McGrath, E., et al. (2019).
494 Food Insecurity, Loneliness, and Social Support among Older Adults. *Journal of Hunger*
495 *and Environmental Nutrition*, in press.
- 496 Caouette, S., Boss, L., & Lynn, M. (2020). The Relationship Between Food Insecurity and Cost-
497 Related Medication Nonadherence in Older Adults: A Systematic Review. *The American*
498 *Journal of Nursing*, 120(6), 24-36.
- 499 Carder, P., Luhr, G., & Kohon, J. (2016). Differential Health and Social Needs of Older Adults
500 Waitlisted for Public Housing or Housing Choice Vouchers. *Journal of Aging and Social*
501 *Policy*, 28(4), 246-260.

- 502 Centerdata (2019). *DNB Household Survey (DHS): Unique collection of data that allows the*
503 *study of both psychological and economic aspects of financial behavior.* (Projects).
504 Tilburg: Tilburg University.
- 505 Coleman-Jensen, A., Rabbitt, M., Gregory, C., & Singh, A. (2017). *Household Food Security in*
506 *the United States in 2016* (Economic Research Report No. (ERR-237)). Washington:
507 Economic Research Service, U.S. Department of Agriculture.
- 508 Coleman-Jensen, A., Rabbitt, M. P., Gregory, C. A., & Singh, A. (2019). *Household Food*
509 *Security in the United States in 2018* (Economic Research Report Number 270).
510 Economic Research Service, United States Department of Agriculture.
- 511 Coleman-Jensen, A., Rabbitt, M. P., Gregory, C. A., & Singh, A. (2020). *Household Food*
512 *Security in the United States in 2019* (Economic Research Report Number 275
513 (September)): Economic Research Service, United States Department of Agriculture.
- 514 Dean, W. R., Sharkey, J. R., & Johnson, C. M. (2011). Food insecurity is associated with social
515 capital, perceived personal disparity, and partnership status among older and senior adults
516 in a largely rural area of central Texas. *Journal of Nutrition in Gerontology and*
517 *Geriatrics*, 30(2), 169-186.
- 518 Deutsche Gesellschaft für Ernährung (2012). Situation, Qualität und Zufriedenheit mit dem
519 Angebot von „Essen auf Rädern“. In *Ernährungsbericht* (pp. Kapitel 3). Bonn.
- 520 Diallo, A. F., Falls, K., Hicks, K., McQueen Gibson, E., Obaid, R., Slattum, P., et al. (2020). The
521 Healthy Meal Program: A food insecurity screening and referral program for urban
522 dwelling older adults. *Public Health Nursing*, 37(5), 671-676.
- 523 Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed-mode*
524 *surveys: The tailored design method* (Vol. 4th, Assessment, Evaluation & Research
525 Methods): John Wiley & Sons.
- 526 Disney, R. (2016). Pension reform in the United Kingdom: An economic perspective. *National*
527 *Institute Economic Review*, 237(1), R6-R14.
- 528 DIW (2019). *About SOEP*. Berlin: Deutsches Institut für Wirtschaftsforschung e.V.
- 529 Drentea, P., & Reynolds, J. R. (2015). Where does debt fit in the stress process model? *Society*
530 *and Mental Health*, 5(1), 16-32.
- 531 Eurostat (2016). *People at risk of poverty or social exclusion* (Vol. December, Statistics
532 explained). Brussels.
- 533 Eurostat (2017a). *Comparative price levels of final consumption by private households including*
534 *indirect taxes (EU28 = 100)* (Comparative price levels (Code: tec00120)). Luxembourg:
535 European Commission.
- 536 Eurostat (2017b). *Health care expenditure by financing agent* (Healthcare statistics
537 (hlth_sha_hf)). Luxembourg: European Commission.
- 538 Eurostat (2018). *European food prices monitoring tool* (Price indices (April 05)). Brussels:
539 European Commission,.
- 540 Eurostat (2019). *Ageing Europe: Statistics on working and moving into retirement* (Statistics
541 Explained). Luxembourg: European Commission.
- 542 FAO (2014). *Global Strategic Framework for Food Security & Nutrition (GSF)*. Rome:
543 Committee on World Food Security, Food and Agriculture Organization of the United
544 Nations.
- 545 FAO (2016). *Voices of the hungry: Measuring food insecurity through people's experiences*.
546 Rome: Food and Agriculture Organization of the United Nations.

- 547 Grammatikopoulou, M. G., Gkiouras, K., Theodoridis, X., Tsisimiri, M., Markaki, A. G.,
548 Chourdakis, M., et al. (2019). Food insecurity increases the risk of malnutrition among
549 community-dwelling older adults. *Maturitas*, 119(8), 11-13.
- 550 Green-LaPierre, R. J., Williams, P. L., Glanville, N. T., Norris, D., Hunter, H. C., & Watt, C. G.
551 (2012). Learning from "knocks in life": Food insecurity among low-income lone senior
552 women. *Journal of Aging Research*, 2012(ID 450630), 11 pages.
- 553 Hawkey, L. C., & Cacioppo, J. T. (2007). Aging and loneliness: Downhill quickly? *Current*
554 *Directions in Psychological Science*, 16(4), 187-191.
- 555 Heeringa, W. L., & Bovenberg, A. L. (2012). Generational impacts of demographic changes in
556 pay-as-you-go pension schemes: Measurement and application to the Netherlands.
557 *Economist*, 160(1), 1-16.
- 558 Hernandez, D. C. (2015). The impact of cumulative family risks on various levels of food
559 insecurity. *Social Science Research*, 50(March), 292-302.
- 560 Hernandez, D. C., Daundasekara, S. S., Arlinghaus, K. R., Tobar, N., Reitzel, L. R., Kendzor, D.
561 E., et al. (2019). Cumulative Risk Factors Associated with Food Insecurity among Adults
562 who Experience Homelessness. *Health Behavior Research*, 2(1), 1-18.
- 563 Horlemann, G. (2017). *Essen auf Rädern: Für viele Senioren unentbehrlich* (Das Bayerische
564 Verbraucherportal (11/28/2017)). Munich: VerbraucherService Bayern.
- 565 ISER (2019). *Understanding Society: The UK Household Longitudinal Study*. Colchester:
566 Economic and Social Research Council and Institute for Social and Economic Research
567 (ISER), University of Essex.
- 568 Johnson, M. A. (2013). Strategies to improve diet in older adults. *Proceedings of the Nutrition*
569 *Society*, 72(1), 166-172.
- 570 Joint Center for Housing Studies (2018). *Housing America's older adults 2018* (A supplement to
571 the state of the nation's housing report). Cambridge: Harvard University.
- 572 Jones, R. (2016). *Welcome to the bank where financial advice is free - it's a food bank* (Family
573 finances (January 30)). London: The Guardian.
- 574 Keller, H. H., Dwyer, J. J. M., Edwards, V., Senson, C., & Edward, H. G. (2007). Food security
575 in older adults: Community service provider perceptions of their roles. *Canadian Journal*
576 *on Aging*, 26(4), 317-328.
- 577 Kenney, C. T. (2008). Father doesn't know best? Parent's control of money and children's food
578 insecurity. *Journal of Marriage and Family*, 70(August), 654-669.
- 579 Lee, J. S., Shannon, J., & Brown, A. (2015). Characteristics of Older Georgians Receiving Older
580 Americans Act Nutrition Program Services and Other Home- and Community-Based
581 Services: Findings from the Georgia Aging Information Management System (GA
582 AIMS). *Journal of Nutrition in Gerontology and Geriatrics*, 34(2), 168-188.
- 583 Loopstra, R. (2018). Interventions to address household food insecurity in high-income
584 countries. *Proceedings of the Nutrition Society* 77, 270-281.
- 585 Loopstra, R., Fledderjohann, J., Reeves, A., & Stuckler, D. (2018). Impact of welfare benefit
586 sanctioning on food insecurity: A dynamic cross-area study of food bank usage in the
587 UK. *Journal of Social Policy*, 47(3), 437-457.
- 588 Loopstra, R., Reeves, A., MartinMcKee, & Stuckler, D. (2016). Food insecurity and social
589 protection in Europe: Quasi-natural experiment of Europe's great recessions 2004–2012.
590 *Preventive Medicine*, 89, 44-50.
- 591 Loopstra, R., & Tarasuk, V. (2015). Food bank usage is a poor indicator of food insecurity:
592 Insights from Canada. *Social Policy and Society*, 14(3), 443-455.

- 593 Lyles, C. R., Schafer, A. L., & Seligman, H. K. (2014). Income, food insecurity, and
594 osteoporosis among older adults in the 2007-2008 national health and nutrition
595 examination survey (NHANES). *Journal of Health Care for the Poor and Underserved*,
596 25(4), 1530-1541.
- 597 McIntyre, L., Dutton, D. J., Kwok, C., & Emery, J. C. H. (2016). Reduction of food insecurity
598 among low-income Canadian seniors as a likely impact of a guaranteed annual income.
599 *Canadian Public Policy*, 42(3), 274-286.
- 600 Meyers, L. S., Gamst, G., & Guarino, A. J. (2017). *Applied Multivariate Research: Design and*
601 *Interpretation* (3ed.). Thousand Oaks: SAGE Publications.
- 602 Miller, L. M. S., Tancredi, D. J., Kaiser, L. L., & Tseng, J. T. (2020). Midlife vulnerability and
603 food insecurity: Findings from low-income adults in the US National Health Interview
604 Survey. *PLoS ONE*, 15(7), TBD.
- 605 Morgan, M. G., Fischhoff, B., Bostrom, A., & Atman, C. J. (2002). *Risk communication: A*
606 *mental models approach*. Cambridge: Cambridge University Press.
- 607 National Association of Care Catering (2016). *The number of councils providing meals on*
608 *wheels to vulnerable older people has dropped below 50% for the first time* (Press release
609 (Nov 8)). Faygate.
- 610 Niedzwiedz, C. L., Pell, J. P., & Mitchell, R. (2015). The relationship between financial distress
611 and life-course socioeconomic inequalities in well-being: Cross-national analysis of
612 European welfare states *American Journal of Public Health*, 105(10), 2090-2098.
- 613 OECD (2017). *Old-age income poverty* (Pensions at a Glance 2017: OECD and G20 Indicators).
614 Paris: OECD Publishing.
- 615 Park, J. Y., Ville, A. S., Schwinghamer, T., & Melgar-Quiñonez, H. (2019). Heterogeneous
616 factors predict food insecurity among the elderly in developed countries: insights from a
617 multi-national analysis of 48 countries. *Food Security*, 11(3), 541-552.
- 618 Pearlman, L. I., Menaghan, E. G., Lieberman, M. A., & Mullan, J. T. (1981). The stress process.
619 *Journal of Health and Social Behavior*, 22, 337-356.
- 620 Penders, Y. W. H., Rietjens, J., Albers, G., Croezen, S., & Block, L. V. d. (2017). Differences in
621 out-of-pocket costs of healthcare in the last year of life of older people in 13 European
622 countries. *Palliative Medicine*, 31(1), 42-52.
- 623 Pfeiffer, S., Ritter, T., & Oestreicher, E. (2015). Food insecurity in German households:
624 Qualitative and quantitative data on coping, poverty consumerism and alimentary
625 participation. *Social Policy and Society*, 14(3), 483-495.
- 626 Piazza, K. (2018). *Communication by email (April 30)*. Plano, TX: Research Now.
- 627 Pirrie, M., Harrison, L., Angeles, R., Marzanek, F., Ziesmann, A., & Agarwal, G. (2020).
628 Poverty and food insecurity of older adults living in social housing in Ontario: A cross-
629 sectional study. *BMC Public Health*, 20(1), 1320.
- 630 Purdam, K., & Esmail, A. (2019). Food insecurity amongst older people in the UK. *British Food*
631 *Journal*, (published online).
- 632 Read, S., Grundy, E., & Foverskov, E. (2016). Socio-economic position and subjective health
633 and well-being among older people in Europe: A systematic narrative review. *Aging &*
634 *Mental Health*, 20(5), 529-542.
- 635 Rona-Tas, A., & Guseva, A. (2018). Consumer Credit in Comparative Perspective. *Annual*
636 *Review of Sociology*, 44, 55-75.

- 637 Russell, J., Flood, V., Yeatman, H., & Mitchell, P. (2014). Prevalence and risk factors of food
638 insecurity among a cohort of older Australians. *Journal of Nutrition, Health and Aging*,
639 *18*(1), 3-8.
- 640 Seligman, H. K., Jacobs, E. A., López, A., Tschann, J., & Fernandez, A. (2012). Food insecurity
641 and glycemic control among low-income patients with type 2 diabetes. *Diabetes Care*,
642 *35*(2), 233-238.
- 643 Seligman, H. K., Laraia, B. A., & Kushel, M. B. (2010). Food Insecurity Is Associated with
644 Chronic Disease among Low-Income NHANES Participants. *The Journal of Nutrition*,
645 *140*(2), 304-310.
- 646 Sharkey, J. R., Dean, W. R., & Johnson, C. M. (2011). Country of birth is associated with very
647 low food security among Mexican American older adults living in colonias along the
648 South Texas border with Mexico. *Journal of Nutrition in Gerontology and Geriatrics*,
649 *30*(2), 187-200.
- 650 Smith, D., Thompson, C., Harland, K., Parker, S., & Shelton, N. (2018). Identifying populations
651 and areas at greatest risk of household food insecurity in England. *Applied Geography*,
652 *91*(21-31).
- 653 Statista (2017). *Total number of food banks in the Netherlands from 2011 to 2017* (Society,
654 Economy). London.
- 655 Tafel Deutschland (2018). *Die Tafeln: Gemeinsam Menschen Helfen (engl.: Food banks:
656 Together helping people)* (Jahresbericht 2017 (engl.: Annual report 2017)). Berlin: Tafel
657 Deutschland e. V.
- 658 Tenny, S., & Hoffman, M. R. (2020). *Odds Ratio (OR)* (StatPeals). Bethesda: StatPearls
659 Publishing.
- 660 The Trussell Trust (2018). “Benefit levels must keep pace with rising cost of essentials” as
661 record increase in foodbank figures is revealed (Press release). Salisbury.
- 662 Upton, J. B., Ciss, J. D., & Barrett, C. B. (2016). Food security as resilience: Reconciling
663 definition and measurement. *Agricultural Economics*, *47*(Supplement), 135-147.
- 664 van Rooij, M. C. J., Lusardi, A., & Alessie, R. J. M. (2011). Financial literacy and retirement
665 planning in the Netherlands. *Journal of Economic Psychology*, *32*(4), 593-608.
- 666 Vandentorren, S., Méner, E. L., Oppenheim, N., Arnaud, A., Jangal, C., Caum, C., et al. (2016).
667 Characteristics and health of homeless families: The ENFAMS survey in the Paris region,
668 France 2013. *European Journal of Public Health*, *26*(1), 71-76.
- 669 Vargas Puello, V., Alvarado, O., S., & Atalah Samur, E. (2013). Food insecurity among elderly
670 people in 15 districts of the great Santiago area; an unresolved issue [Inseguridad
671 alimentaria en adultos mayores en 15 comunas del gran Santiago; un tema pendiente].
672 *Nutricion Hospitalaria*, *28*(5), 1430-1437.
- 673 Wang, E. A., McGinnis, K. A., Fiellin, D. A., Goulet, J. L., Bryant, K., Gibert, C. L., et al.
674 (2011). Food insecurity is associated with poor virologic response among HIV-infected
675 patients receiving antiretroviral medications. *Journal Of General Internal Medicine*,
676 *26*(1012-1018).
- 677 Wang, E. A., McGinnis, K. A., Goulet, J., Bryant, K., Gibert, C., Leaf, D. A., et al. (2015). Food
678 insecurity and health: Data from the veterans aging cohort study. *Public Health Reports*,
679 *130*(3), 261-268.
- 680 Wolfe, W. S., Frongillo, E. A., & Valois, P. (2003). Understanding the experience of food
681 insecurity by elders suggests ways to improve its measurement. *Journal of Nutrition for
682 the Elderly*, *133*(9), 2762-2769.

Financial stress and food insecurity among older adults

- 683 Yelowitz, A. (2017). Local housing costs and basic household needs. *Empirical Economics*, 52,
684 901-923, doi:DOI 10.1007/s00181-016-1185-2.
- 685 Ziegelmeyer, M., & Nick, J. (2013). Backing out of private pension provision: Lessons from
686 Germany. *Empirica*, 40(3), 505-539.
- 687 Ziliak, J. P., & Gundersen, C. (2018). *The state of senior hunger in America 2016* (An annual
688 report prepared for Feeding America and the National Foundation to End Senior Hunger).
689 Chicago: Feeding America
- 690 Ziliak, J. P., & Gundersen, C. (2020). *The State of Senior Hunger in America 2018: An Annual*
691 *Report*. Chicago: Feeding America.
- 692
- 693

694 **Tables**

695

696 **Table 1** Descriptive statistics of financial stressors and socio-economic characteristics of food
697 secure and food insecure individuals, by country; mean (SD) or percent

Variable:	United Kingdom		Germany		The Netherlands	
	Food secure	Food insecure	Food secure	Food insecure	Food secure	Food insecure
Food security (%)	75.7	24.3	71.5	28.5	65.0	35.0
Summed financial stressors (12-60)	23.1 (5.9)	26.9 (6.7)	18.5 (5.1)	22.9 (5.8)	21.7 (5.7)	25.9 (7.1)
Financial stressors (1-5):						
Income loss due to job loss; working fewer hours; unable to work	1.7 (1.2)	2.1 (1.5)	1.3 (0.8)	1.5 (1.2)	1.2 (0.7)	1.5 (1.2)
Income loss due to entering retirement	2.9 (1.4)	3.4 (1.5)	2.3 (1.4)	3.0 (1.7)	2.5 (1.6)	2.9 (1.7)
Costs of death/ separation/ divorce of spouse/partner	1.7 (1.3)	2.0 (1.6)	1.4 (1.0)	1.8 (1.4)	1.4 (1.1)	1.8 (1.4)
Cost of daily living	3.6 (1.0)	4.1 (1.0)	2.1 (1.0)	2.7 (1.1)	3.2 (1.1)	3.6 (1.2)
Cost increases in rent, utilities	3.1 (1.3)	3.7 (1.3)	2.1 (1.2)	2.7 (1.3)	3.0 (1.3)	3.3 (1.3)
Costs due to illness, accidents, addiction	1.5 (0.9)	1.7 (1.1)	1.6 (1.1)	2.3 (1.3)	2.6 (1.4)	3.0 (1.4)
Cost of at-home or institutional care	1.2 (0.7)	1.5 (1.2)	1.1 (0.5)	1.2 (0.7)	1.5 (1.0)	2.0 (1.3)
Debt from credit cards, consumer loans, mortgage	2.2 (1.4)	2.7 (1.5)	1.7 (1.1)	2.1 (1.3)	1.7 (1.2)	2.2 (1.4)
Debt from failed business/self-employment	1.3 (0.83)	1.2 (0.8)	1.1 (0.6)	1.4 (0.9)	1.1 (0.6)	1.2 (0.8)
Debt from payday or short-term loans	1.1 (0.4)	1.2 (0.7)	1.1 (0.4)	1.3 (0.8)	1.1 (0.5)	1.4 (0.9)
Victim of financial scams	1.2 (0.6)	1.3 (0.8)	1.3 (0.8)	1.4 (0.9)	1.2 (0.8)	1.4 (1.0)
Financial support to family member	1.8 (1.2)	2.0 (1.4)	1.4 (0.8)	1.6 (1.0)	1.3 (0.8)	1.7 (1.1)
Socio-economic characteristics:						
Male gender (%)	52.2	48.8	51.4	45.5	55.3	42.3
Age (65-88)	70.6 (4.0)	70.0 (3.7)	70.5 (4.2)	70.4 (4.4)	70.9 (3.7)	70.7 (3.8)
Education, postsecondary (%)	29.1	31.4	27.3	23.8	29.8	34.2
Education, missing (%)	1.1	2.3	1.6	2.0	4.0	4.9
Married or partnered (%)	60.1	48.8	66.4	46.5	64.0	58.5
Married or partnered, missing (%)	1.5	2.3	2.4	3.0	4.4	4.1
Had children (%)	85.8	74.4	85.4	81.2	88.6	85.4
Had children, missing (%)	1.1	2.3	2.0	4.0	4.4	3.3
Urban residence (%)	32.8	31.4	54.1	57.4	42.5	48.8
Urban residence, missing (%)	2.2	3.5	2.4	4.0	5.3	4.9
Homeowner (%)	67.9	69.8	34.8	24.8	36.8	33.3
Homeowner, missing (%)	1.9	3.5	3.2	4.0	4.8	4.9
Monthly net income (1-14)	3.7 (3.1)	2.8 (2.4)	4.2 (2.0)	3.2 (1.6)	3.9 (1.9)	3.5 (2.0)
Monthly mean net income ^{a)} (GBP/EUR)	1,350	895	1,590	1,080	1,425	1,250
Monthly net income, missing (%)	3.0	2.3	5.1	4.0	6.6	7.3
N (total=1,059)	268	86	253	101	228	123

Financial stress and food insecurity among older adults

698 Note: ^{a)} Continuous income in country currency calculated based on income categories to facilitate interpretation;
 699 Median values: United Kingdom: 1,250 GBP, Germany: \$1,750 EUR, the Netherlands: \$1,750 EUR
 700
 701

702 **Table 2** Odds ratios (95% CI) from logistic regressions of food insecurity on individual financial
 703 stressors and socio-economic characteristics, by country
 704

Dependent variable:	(1) United Kingdom	(2) Germany	(3) The Netherlands
	Food insecurity OR (95% CI)	Food insecurity OR (95% CI)	Food insecurity OR (95% CI)
Predictors:	p value	p value	p value
Income loss due to job loss; working fewer hours; unable to work	1.1 (0.9-1.4) p=0.37	1.0 (0.8-1.3) p=0.98	1.2 (0.9-1.6) p=0.31
Income loss due to entering retirement	1.1 (0.9-1.4) p=0.29	1.2 (1.0-1.5) p=0.04	1.1 (0.9-1.2) p=0.50
Costs of death/ separation/ divorce of spouse/partner	1.0 (0.8-1.2) p=0.74	1.1 (0.9-1.4) p=0.55	1.1 (0.9-1.4) p=0.36
Cost of daily living	1.5* (1.0-2.1) p=0.05	1.3 (1.0-1.7) p=0.10	1.1 (0.9-1.5) p=0.41
Cost increases in rent, utilities	1.1 (0.9-1.6) p=0.23	1.0 (0.7-1.3) p=0.81	1.1 (0.8-1.4) p=0.75
Costs due to illness, accidents, addiction	0.9 (0.6-1.2) p=0.31	1.3* (1.0-1.6) p=0.03	1. (0.8-1.2) p=1.00
Cost of at-home or institutional care	1.6* (1.1-2.3) p=0.02	1.0 (0.6-1.6) p=0.94	1.3* (1.0-1.6) p=0.03
Debt from credit cards, consumer loans, mortgage	1.2 (1.0-1.5) p=0.06	1.2 (1.0-1.6) p=0.06	1.2 (1.0-1.5) p=0.09
Debt from failed business/self-employment	0.9 (0.6-1.4) p=0.60	1.3 (0.9-1.8) p=0.17	0.9 (0.6-1.4) p=0.59
Debt from payday or short-term loans	1.0 (0.6-1.7) p=0.99	1.9* (1.2-3.0) p=0.01	1.5 (0.9-2.3) p=0.09
Victim of financial scams	0.9 (0.6-1.3) p=0.55	1.0 (0.7-1.4) p=0.95	0.9 (0.7-1.3) p=0.66
Financial support to family members	1.1 (0.8-1.4) p=0.59	1.1 (0.8-1.5) p=0.56	1.3* (1.0-1.7) p=0.05
Socio-economic characteristics	Yes	Yes	Yes
Omnibus chi-square test (df), p value	52.1*** (20) p<0.001	72.4*** (20) p<0.001	52.2*** (20) p<0.001
Hosmer and Lemeshow test (df), p value	6.4 (8) 0.602	5.0 (8) 0.763	5.8 (8) 0.670
Nagelkerke pseudo R ²	0.20	0.27	0.19
Food insecure	24.3% (N=86)	28.5% (N=101)	35.0% (N=123)
N (total=1,059)	354	354	351

705 Note: *** p<0.001 ** p<0.010, * p<0.050
 706 Regressions control for socio-demographic characteristics including gender, age, education, marital
 707 status, children, residence, homeownership, income
 708

709

710 **Table 3** Odds ratios (95% CI) from logistic regressions of food insecurity on summed financial
 711 stressors, country of residence, and the interaction of both measures
 712

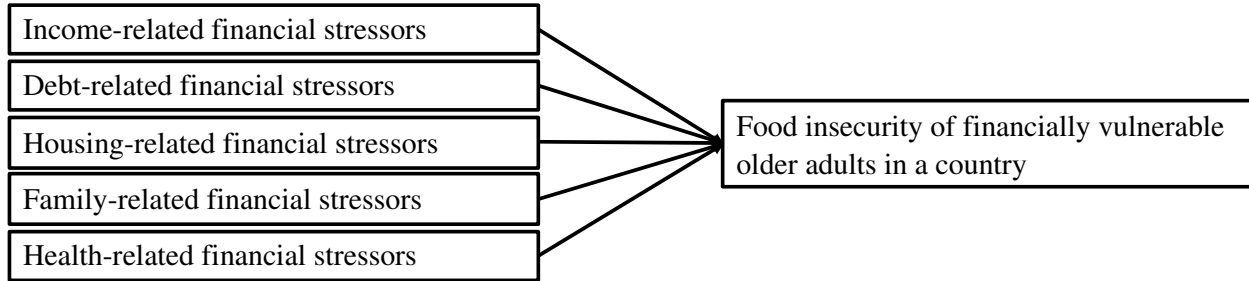
Dependent variable:	(1) Food insecurity (main effect model) OR (95% CI) p value	(2) Food insecurity (interaction model) OR (95% CI) p value
Predictors:		
Summed financial stressors	1.1*** (1.1-1.2) p<0.0010	1.1*** (1.1-1.2) p<0.001
United Kingdom (UK)	0.5*** (0.3-0.7) p<0.0010	0.6 (0.2-2.8) p=0.54
Germany (GER)	1.0 (0.7-1.5) p=0.8877	0.5 (0.1-1.9) p=0.28
Netherlands (NL)	(omitted)	(omitted)
UK x summed financial stressors		1.0 (0.9-1.1) p=0.67
GER x summed financial stressors		1.0 (1.0-1.1) p=0.23
NL x summed financial stressors		(omitted)
Socio-economic characteristics	Yes	Yes
Omnibus chi-square test (df), p value	145.0*** (17) p<0.0010	147.7*** (19) p<0.001
Hosmer and Lemeshow test (df), p value	6.0 (8) p=0.6546	6.5 (8) p=0.59
Nagelkerke pseudo R ²	0.18	0.19
Food insecure in % (N)	29.3% (N=310)	29.3% (N=310)
N	1,059	1,059

713 Note: *** p<0.001 ** p<0.010, * p<0.050
 714 Regressions control for socio-demographic characteristics including gender, age, education, marital
 715 status, children, residence, homeownership, income

716 **Figure**

717 **Figure 1** Analysis of the association of financial stress and food insecurity in older age (RQ2)

718



719

720 **Appendix**721 **Appendix Table 1** Key literature on financial stressors associated with food insecurity in older age
722
723

Stressors	Predictors of food insecurity	Region of the study	Method	Relationship with food insecurity in older age
Income-related financial stressors				
Wang et al. (2015)	Income from employment	United States, Veterans Aging Cohort Study	Quantitative	Earning < \$25,000/year (+)
Barker et al. (2019)	Social security pension income	United Kingdom	Quantitative	Low social security benefits (+)
Russell et al. (2014)	Social security pension income	Australia, Blue Mountains Eye Study	Quantitative	Living on Social Security pension income only (+)
Pirrie et al. (2020)	Poverty	Canada	Quantitative	Experiencing poverty (+)
McIntyre et al. (2016)	Cash transfers	Canada, Canadian Community Health Survey	Quantitative	Guaranteed annual income (-)
Debt-related financial stressors				
Keller et al. (2007)	Debt	Canada	Qualitative	Financial constraints (+)
Joint Center for Housing Studies (2018)	Debt	United States	Quantitative	Mortgage debt (+)
Green-LaPierre et al. (2012)	Income adequacy	Canada	Qualitative	Income adequacy (-)
Housing-related financial stressors				
Vargas Puello et al. (2013)	Homeownership	Chile	Quantitative	Not owning the home (+)
Russell et al. (2014)	Homeownership	Australia, Blue Mountains Eye Study	Quantitative	Rented accommodations (+)
Carder et al. (2016)	Participation in public housing programs	United States	Quantitative	Waitlisted for public housing or housing voucher (+)
Wang et al. (2015)	Homelessness	United States, Veterans Aging Cohort Study	Quantitative	Recent homelessness (+)

Financial stress and food insecurity among older adults

Stressors	Predictors of food insecurity	Region of the study	Method	Relationship with food insecurity in older age
Wolfe et al. (2003)	Transportation	United States	Qualitative	Limited access to transportation (+)
Family-related financial stressors				
Park et al. (2019)	Marital status, social network	48 developed countries, Gallup World Poll	Quantitative	Single (+), lower social support and wellbeing (+)
Johnson (2013)	Social isolation	--	Literature review	Smaller social network (+)
Burris et al. (2019)	Psychosocial factors	United States	Quantitative	Loneliness (+), lack of social support (+)
Health-related financial stressors				
Bengle et al. (2010)	Medication costs	United States	Quantitative	Cost-related medication non-adherence (+)
Caouette et al. (2020)	Medication costs	--	Literature review	Cost-related medication non-adherence (+)
Wang et al. (2011)	Management of chronic diseases	United States, Veterans Aging Cohort Study	Quantitative	Poor control of HIV (+)
Wang et al. (2015)	Management of chronic diseases	United States, Veterans Aging Cohort Study	Quantitative	Poor control of hypertension, diabetes, HIV, and depression (+)
Wolfe et al. (2003)	Physiological functioning	United States	Qualitative	Functional limitations (+), health problems (+)
Demographic and social characteristics				
Miller et al. (2020)	Age	United States, National Health Interview Survey	Quantitative	Younger older adults (+)
Park et al. (2019)	Age	48 developed countries, Gallup World Poll	Quantitative	Younger older adults (+)
Russell et al. (2014)	Gender and age	Australia, Blue Mountains Eye Study	Quantitative	Women (+), age under age 70 (+)
Grammatikopoulou et al. (2019)	Education	Greece	Quantitative	Lower educational attainment (+)
Dean et al. (2011)	Gender, race, income, social support	United States, Brazos Valley Community Health Assessment	Quantitative	Women, African American, low or poverty level income, low social capital (+)

Stressors	Predictors of food insecurity	Region of the study	Method	Relationship with food insecurity in older age
Sharkey et al. (2011)	Immigrant	United States	Quantitative	Being born in Mexico (+)
Wang et al. (2015)	Race	United States, Veterans Aging Cohort Study	Quantitative	African American or other minority status (+)
Bengle et al. (2010)	Race, age, educational attainment, income, health status	United States, Georgia	Quantitative	Younger age, African American, less educated lower income, lower self-reported health (+)

724

Appendix Table 2 Survey instrument

This survey is part of a university-based research project to learn how people deal with financial difficulty in older age. This research project is run by the Centre for Decision Research at Leeds University Business School.

Participation in this study is voluntary, however, you can help us very much by taking a few minutes to share your experiences. Please try to answer all the questions. If you want to skip a question, you can do so. You can stop the survey at any time without providing a reason. The survey will take about 15 minutes to complete. Please answer all questions in one sitting. During the survey, please do not use the back button in your browser window.

Your responses will be completely confidential. We will not record your name or contact details from the survey panel. Thank you for considering taking part.

Screening Questions

Before we begin the survey, please provide the following details. Do any of the following situations apply to you?

S1 I barely make ends meet and cannot save.

- Yes
- No

S2 I currently have run up problem debt on, for example, credit cards or overdrafts.

- Yes
- No

S3 I have contacted a debt advice agency in the past five years.

- Yes
- No

S4 What is your year of birth?

- After 1950
- 1946 to 1950
- 1941 to 1945
- 1940 and earlier

S5 What is your sex?

- Male
- Female

Section 1: Questions About Money Management

1.1 To what extent do the following cause you financial difficulty?

Response options: Not at all, Very little, Somewhat, Quite a bit, A great deal

Lost job; working fewer hours; unable to work

Entering retirement

Death/separation/divorce of spouse/partner

Cost of living

Increases in rent, utilities

Medical costs due to illness, accidents, addiction

Cost of at-home or institutional care

Debt from credit cards, consumer loans, mortgage

Debt from failed business/self-employment

Payday or short-term loans

Being a victim of financial scams

Finding money management and budgeting difficult

Providing financial support to family member

Other cause for financial difficulty. Please specify:

1.2 We are interested in your behaviour related to planning for your financial future. Have you personally gathered together your household's financial information, reviewed it in detail, and formulated a specific financial plan for your household?

- Yes

- To some extent

- No

1.3.1 How much do you agree with the following financial planning statements?

I set financial goals for what I want to achieve with my money.

- Strongly Disagree

- Disagree

- Neither Agree nor Disagree

- Agree

- Strongly Agree

1.3.2 I decide beforehand how my money will be used.

- Strongly Disagree

- Disagree

- Neither Agree nor Disagree

- Agree

- Strongly Agree

Financial stress and food insecurity among older adults

1.3.3 I actively consider the steps I need to take to stick to my budget.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

1.3.4 I consult my budget to see how much money I have left.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

1.3.5 I like to look to my budget in order to get a better view of my spending in the future.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

1.3.6 It makes me feel better to have my finances planned out.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

1.4.1 The following statements inquire about how people manage their possessions. Please state your agreement with each item below.

If you take good care of your possessions, you will definitely save money in the long run.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

1.4.2 There are many things that are normally thrown away that are still quite useful.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

1.4.3 Making better use of my resources makes me feel good.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

1.4.4 If you can re-use an item you already have, there's no sense in buying something new.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

1.4.5 I believe in being careful in how I spend my money.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

1.4.6 I discipline myself to get the most from my money.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

1.4.7 I am willing to wait on a purchase I want so that I can save money.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

1.4.8 There are things I resist buying today so I can save for tomorrow.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

Financial stress and food insecurity among older adults

1.5 What is your attitude towards debt? Please indicate which statement below best reflects your attitude:

- I reject debt on principle, because one should only spend the money that one has.
- I only go into debt in emergencies, if there is no alternative.
- I take on debt to finance necessary expenditures.
- Going into debt increases my quality of life. It allows me to buy things I couldn't otherwise afford.

1.6.1 Suppose you had £100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?

- More than £102
- Exactly £102
- Less than £102
- Don't know

1.6.2 Suppose you had £100 in a savings account and the interest rate was 20% per year. After 5 years, how much do you think you would have in the account if you left the money to grow?

- More than £200
- Exactly £200
- Less than £200
- Don't know

1.6.3 Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, how much would you be able to buy with the money in the account?

- More than today
- Exactly the same
- Less than today
- Don't know

1.6.4 Assume a friend inherits £10,000 today and his sibling inherits £10,000 3 years from now. Who is richer because of the inheritance?

- My friend
- His sibling
- They are equally rich
- Don't know

1.6.5 Suppose that in the year 2017 your income has doubled and prices of all goods have doubled, too. In 2017, how much will you be able to buy with your income?

- More than today
- The same
- Less than today
- Don't know

1.7 How confident are you that your responses to the previous five financial questions are correct?

- Not at all confident
- Not very confident
- Somewhat confident
- Very confident
- Extremely confident

1.8.1 Using the scale provided, please indicate how much each of the following statements reflects how you are typically. I am good at resisting temptations.

- Not at all
- Very little
- Somewhat
- Moderately
- Very much

1.8.2 I am able to work effectively toward long-term goals.

- Not at all
- Very little
- Somewhat
- Moderately
- Very much

1.8.3 People would say that I have iron self-discipline.

- Not at all
- Very little
- Somewhat
- Moderately
- Very much

1.8.4 I have a hard time breaking bad habits.

- Not at all
- Very little
- Somewhat
- Moderately
- Very much

1.8.5 I do certain things that are bad for me, if they are fun.

- Not at all
- Very little
- Somewhat
- Moderately
- Very much

Financial stress and food insecurity among older adults

1.8.6 I have trouble concentrating.

- Not at all
- Very little
- Somewhat
- Moderately
- Very much

1.8.7 Sometimes I can't stop myself from doing something, even if I know it is wrong.

- Not at all
- Very little
- Somewhat
- Moderately
- Very much

1.8.8 I often act without thinking through all of the alternatives.

- Not at all
- Very little
- Somewhat
- Moderately
- Very much

Section 2: Questions About Your Financial Situation

2.1.1 A household may have different sources of income and more than one member of the household may contribute to it. Thinking of your, or your household's, total income, how easily are you, or is your household, able to make ends meet, i.e., to pay for your usual necessary expenses?

- With great difficulty
- With difficulty
- With some difficulty
- Fairly easily
- Easily
- Very easily

2.1.2 Please think about your, or your household's, total housing costs including mortgage repayment (instalment and interest) or rent, insurance and service charges (sewage removal, refuse removal, regular maintenance, repairs and other charges). To what extent are these costs a financial burden to you or your household? Would you say they are:

- A heavy burden
- A slight burden
- No burden at all

2.1.3 Do you, or anyone in your household, have to repay debts from any credit card, hire purchase or other loans (that is, excluding mortgage repayments or other loans connected with the purchase of main dwelling)? If so, to what extent is the repayment of such loans a financial burden for your household? Would you say it is:

- A heavy burden
- A slight burden
- No burden at all
- My household does not have such debt

2.2.1 In the last 12 months, have you been in arrears, i.e. have been unable to pay on time due to financial difficulties for utility bills (heating, electricity, gas, water, etc.) for the main dwelling?

- Yes, once
- Yes, twice or more
- No

2.2.2 In the last 12 months, have you been in arrears on credit cards or other loan payments, i.e. have been unable to pay on time due to financial difficulties? Please note that mortgage instalments for main dwelling are excluded.

- Yes, once
- Yes, twice or more
- No
- My household does not have such debt

2.2.3 In the last 12 months, have you been in arrears on rent or mortgage repayments for the main dwelling, i.e. have been unable to pay in time due to financial difficulties?

- Yes, once
- Yes, twice or more
- No
- I don't have rent or mortgage payments

2.3.1 People have made the following statements about their food situation. For these statements, please indicate whether the statement was often true, sometimes true, or never true for your household in the last 12 months.

“I worried whether my/our food would run out before I/we got money to buy more.” Was this statement often true, sometimes true, or never true for you or your household in the last 12 months?

- Often true
- Sometimes true
- Never true
- Don't know
- Prefer not to answer

Financial stress and food insecurity among older adults

2.3.2 “The food that I/we bought just didn’t last, and I/we didn’t have money to get more.” Was this statement often, sometimes, or never true for you or your household in the last 12 months?

- Often true
- Sometimes true
- Never true
- Don't know
- Prefer not to answer

2.3.3 “I/we couldn’t afford to eat balanced meals.” Was this statement often, sometimes, or never true for you or your household in the last 12 months?

- Often true
- Sometimes true
- Never true
- Don't know
- Prefer not to answer

2.3.4 In the last 12 months, since last October, did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food?

- Yes
- No
- Don't know
- Prefer not to answer

2.3.5 How often did this happen?

- Almost every month
- Some months but not every month
- Only 1 or 2 months
- Don't know
- Prefer not to answer

2.3.6 In the last 12 months, did you ever eat less than you felt you should because there wasn’t enough money for food?

- Yes
- No
- Don't know
- Prefer not to answer

2.3.7 In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?

- Yes
- No
- Don't know
- Prefer not to answer

2.3.8 In the last 12 months, did you lose weight because there wasn't enough money for food?

- Yes
- No
- Don't know
- Prefer not to answer

2.3.9 In the last 12 months, did you or other adults in your household ever not eat for a whole day because there wasn't enough money for food?

- Yes
- No
- Don't know
- Prefer not to answer

2.3.10 How often did this happen?

- Almost every month
- Some months but not every month
- Only 1 or 2 months
- Don't know
- Prefer not to answer

Section 3: Questions About Personal Characteristics

3.1.1 Please state your agreement with each item below.

In most ways my life is close to ideal.

- Strongly disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

3.1.2 The conditions of my life are excellent.

- Strongly disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

3.1.3 I am satisfied with my life.

- Strongly disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

Financial stress and food insecurity among older adults

3.1.4 So far I have gotten the important things I want in life.

- Strongly disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

3.1.5 If I could live my life over, I would change almost nothing.

- Strongly disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

3.2.1 Getting older is often associated with loneliness. How often do you feel that way? How often do you feel that you lack companionship?

- Never
- Rarely
- Sometimes
- Very often
- Always

3.2.2 How often do you feel left out?

- Never
- Rarely
- Sometimes
- Very often
- Always

3.2.3 How often do you feel isolated from others?

- Never
- Rarely
- Sometimes
- Very often
- Always

3.3 How often during the previous week did you feel lonely? Please indicate the number of days below.

- Never
- 1 day
- 2 days
- 3 days
- 4 days
- 5 days
- 6 days
- 7 days

3.4 Have you felt or acted in any of the following ways over the past 12 months? Yes, No
Have you dropped many of your activities and interests?
Do you feel that your life is empty?
Are you afraid that something bad is going to happen to you?
Do you often feel helpless?
Do you prefer to stay at home, rather than going out and doing new things?
Do you feel you have more problems with memory than most?
Do you feel pretty worthless the way you are now?
Do you feel that your situation is hopeless?

3.5.1 The questions below ask about your thoughts and feelings over the past month.
In the last month, how often have you felt that you were unable to control the important things in your life
- Never
- Rarely
- Sometimes
- Very often
- Always

3.5.2 In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?
- Never
- Rarely
- Sometimes
- Very often
- Always

3.5.4 In the last month, how often have you felt that things were going your way?
- Never
- Rarely
- Sometimes
- Very often
- Always

3.5.3 In the last month, how often have you felt confident about your ability to handle your personal problems?
- Never
- Rarely
- Sometimes
- Very often
- Always

Financial stress and food insecurity among older adults

3.6 The following lists some ways that people might try to cope with difficult financial situations. Think of a difficult financial situation you experienced in the past 12 months.

To what extent did you try to cope with it in the following ways?

Response options: Not at all, Very little, Somewhat, Moderately, Very much

I turned to work or other activities to take my mind off financial things.

I concentrated my efforts on doing something about the financial situation.

I said to myself "this isn't real."

I turned to alcohol or other drugs to make myself feel better.

I gave up trying to deal with it.

I spoke or acted in ways to release my unpleasant feelings.

I got financial help and advice from other people.

I made jokes about my financial situation.

I tried to get help from other people about what to do with my finances.

I learned to live with it.

I blamed myself for things that had happened.

I prayed or meditated.

Section 4: Responses to Debt

Please imagine the following situation. Three months ago, you were behind on two bills and in making your monthly credit card payment. At the time, your total debt was £4,000. You believe that had you contacted a debt advisory agency, you could have dealt with this debt easily and quickly. Now you are falling behind on your rent and utility bills. You realize you are £7,000 in debt.

Please imagine the following situation. Three months ago, you were behind on two bills and in making your monthly credit card payment. At the time, your total debt was £6,500. You believe that had you contacted a debt advisory agency, you could have dealt with this debt easily and quickly. Now you are falling behind on your rent and utility bills. You realize you are £7,000 in debt.

Please imagine the following situation. You are behind on two bills and in making your monthly credit card payment. Now you are falling behind on your rent and utility bills. You realize you are £7,000 in debt.

4.1 Would you go to a debt advisory agency now?

- Certainly not=1

- 2

- 3

- 4

- Certainly yes=5

4.2 Would you regret not having contacted a debt advisory agency earlier?

- Regret not at all=1
- 2
- 3
- 4
- Regret very much=5

4.3 How difficult do you think it would be to contact a debt advisory agency?

- Not at all difficult=1
- 2
- 3
- 4
- Very difficult=5

4.4 How ashamed do you think you would be about having to contact a debt advisory agency?

- Not at all ashamed=1
- 2
- 3
- 4
- Very ashamed=5

4.5 How difficult do you think it would be to pay off your debt?

- Not at all difficult=1
- 2
- 3
- 4
- Very difficult=5

Section 5: Questions About Health and Aging

5.1 How would you rate your health currently?

- Excellent health
- Very good health
- Good health
- Fair health
- Poor health

5.2 In the past 14 days, have you engaged in any of the following activities? Please tick all that apply.

- Walking
- Gardening
- Dancing
- Hiking
- Tennis
- Biking
- Jogging

Financial stress and food insecurity among older adults

- Aerobic exercise
- Other physical activities, please specify _____

5.3.1 How many of your relatives (other than your spouse/partner, parents, or children) do you see or talk to on the phone at least once every two weeks?

- None
- 1
- 2
- 3
- 4
- 5
- 6
- 7 or more

5.3.2 How many of your friends do you see or talk to at least once every two weeks?

- None
- 1
- 2
- 3
- 4
- 5
- 6
- 7 or more

5.3.3 Do you belong to a church, temple, or other religious group?

- Yes
- No

5.3.4 Do you belong to a non-religious group, e.g. civic group; neighbourhood group; sports club?

- Yes
- No

2.14 Do you regularly socialize with people while at work?

- Yes
- No socializing
- I don't work

6.12 Please provide the following background information.

What is your current legal marital status?

- Single and never married or never in a civil partnership
- Married or in a Civil Partnership
- Separated, divorced, or legally dissolved Civil Partnership
- Widowed or surviving Civil Partner

6.13 Do you currently live with someone as a couple without being married or having a civil partnership?

- Yes
- No

6.14 How many people live in your household including yourself?

- 1
- 2
- 3
- 4
- 5
- 6
- 7 or more persons

6.15 How many children have you had, including step, adopted, and biological children?

- No children
- 1
- 2
- 3
- 4
- 5
- 6
- 7 or more

5.4.1 Adult children differ in their ability to support their aging parents financially. How much do you agree with the following statements?

My children help out financially where they can.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

5.4.2 I am completely open with my children about my financial situation.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

5.4.3 My children see it as their duty to support their parents financially.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

Financial stress and food insecurity among older adults

5.4.4 I don't expect my children to help me financially.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

5.4.5 I can't see my children having the money to support me financially.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

5.4.6 My financial difficulties should not be my children's burden.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

5.4.7 My children don't know about my financial difficulties.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

5.4.8 I've got to leave an inheritance for my children.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

5.5.1 Some people receive guidance and support from a significant other. How much do you agree with the following statements?

My spouse/partner is willing to listen when I need to talk about financial worries or problems.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

5.5.2 My spouse/partner is is someone with whom I can share private feelings and concerns about money.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

5.5.3 My spouse/partner is constantly snapping, blaming, and saying financial problems are my fault.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

5.5.4 Almost daily, I feel bothered or upset by my spouse/partner because of financial issues.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

Section 6: Demographic Questions

6.1 To better understand your responses to the questions in this survey, we need to ask you some basic demographic questions. Please be assured that we will keep your information confidential.

In what year were you born? Please select the correct year from the following list.

- 1925
- 1926
- 1927
- 1928
- 1929
- 1930
- 1931
- 1932
- 1933
- 1934
- 1935
- 1936
- 1937
- 1938
- 1939
- 1940
- 1941

Financial stress and food insecurity among older adults

- 1942
- 1943
- 1944
- 1945
- 1946
- 1947
- 1948
- 1949
- 1950

6.2 Which of these best describes your current employment situation?

- Retired
- In paid employment (full- or part-time)
- Self-employed
- Unemployed
- Looking after family or home
- Full-time student
- Long-term sick or disabled
- On a government training scheme
- Unpaid worker in family business
- Working in an apprenticeship
- Doing something else

6.3 What is the highest educational or school qualification you obtained?

- University higher degree (MSc, PhD)
- First degree-level qualification (e.g. bachelors degree, graduate membership of a professional institute, PGCE)
- Diploma in higher education
- Teaching qualification
- Other post-secondary education degree
- A-level
- GCSE or O-Level
- Other qualifications on leaving school
- No qualifications

6.4 To better understand your responses to the questions in this survey, we need to ask you also about your finances. Please be assured that we will keep your information confidential.

What is the current MONTHLY gross income of your household, that is before any deductions are made for tax, National Insurance, pensions, union dues etc.? If you don't have the exact numbers at hand, please give us your best guess.

- Less than £500 per month
- £500 to under £1,000
- £1,000 to under £1,500
- £1,500 to less than £2,000
- £2,000 to less than £2,500
- £2,500 to less than £3,000

- £3,000 to less than £3,500
- £3,500 to less than £4,000
- £4,000 to less than £4,500
- £4,500 to less than £5,000
- £5,000 to less than £7,500
- £7,500 to less than £10,000
- £10,000 to less than £15,000
- £15,000 to less than £20,000
- £20,000 and higher

6.5 What is the current MONTHLY net income of your household, that is after any deductions are made for tax, National Insurance, pensions, union dues, etc.? It is the "take-home pay." Please include all household members. If you don't have the exact numbers at hand, please give us your best guess.

- Less than £500 per month
- £500 to less than £1,000
- £1,000 to less than £1,500
- £1,500 to less than £2,000
- £2,000 to less than £2,500
- £2,500 to less than £3,000
- £3,000 to less than £3,500
- £3,500 to less than £4,000
- £4,000 to less than £4,500
- £4,500 to less than £5,000
- £5,000 to less than £7,500
- £7,500 to less than £10,000
- £10,000 to less than £15,000
- £15,000 and higher

6.6 Do you feel that your income is adequate to fulfill your needs and wants?

- 1=We do not have enough money to buy even the cheapest food and clothes
- 2
- 3
- 4
- 5=We can afford to buy everything we want and also save for the future

6.7 What is the TOTAL amount of savings of all household members? Please include non-pension savings in current accounts, savings accounts, ISAs, and investments in stocks and bonds. Do not include pension savings. If you don't have the exact numbers at hand, please give us your best guess.

- No savings
- Less than £250 in total savings
- £250 to less than £500
- £500 to less than £1,000
- £1,000 to less than £2,500
- £2,500 to less than £5,000

Financial stress and food insecurity among older adults

- £5,000 to less than £10,000
- £10,000 to less than £25,000
- £25,000 to less than £50,000
- £50,000 to less than £100,000
- £100,000 to less than £249,000
- £250,000 to less than £500,000
- £500,000 and more

6.8 What is the total amount of PENSION savings of all household members? Please include occupational pension savings at a current or previous employer and personal pension savings.

- No occupational or personal pension savings
- Less than £5,000
- £5,000 to less than £10,000
- £10,000 to less than £20,000
- £20,000 to less than £30,000
- £30,000 to less than £40,000
- £40,000 to less than £50,000
- £50,000 to less than £100,000
- £100,000 to less than £250,000
- £250,000 to less than £500,000
- £500,000 and more

6.9 How high are the MONTHLY debt repayment obligations of all household members? Please include your monthly mortgage (principal, interest, taxes and insurance) and home equity loan payments as well as monthly payments for car loans, student loans, loans from family or friends, your minimum monthly payments on credit card debt, and on any other loans that you have.

- No debt
- Less than £100 per month
- £100 to less than £250
- £250 to less than £500
- £500 to less than £1,000
- £1,000 to less than £1,500
- £1,500 to less than £2,000
- £2,000 to less than £2,500
- £2,500 to less than £3,000
- £3,000 to less than £3,500
- £3,500 to less than £4,000
- £4,000 to less than £4,500
- £4,500 to less than £5,000
- £5,000 to less than £7,500
- £7,500 to less than £10,000
- £10,000 and more

6.10 What is the TOTAL debt burden of your household? Please include the outstanding loan balances on credit cards, bank loans, the amount of study loans you still have to repay, loans from family or friends, and any other loans. Please do not include your mortgage.

- No debt
- Less than £500 in total debt
- £500 to less than £1,000
- £1,000 to less than £5,000
- £5,000 to less than £10,000
- £10,000 to less than £15,000
- £15,000 to less than £20,000
- £20,000 to less than £30,000
- £30,000 to less than £40,000
- £40,000 to less than £50,000
- £50,000 to less than £75,000
- £75,000 to less than £100,000
- £100,000 and more

6.10 In the past 10 years, have you participated in any of the following as debt solutions? Please tick all that apply.

- Debt management plan
- Bankruptcy, sequestration, LILA bankruptcy, MAP bankruptcy
- Individual voluntary arrangement (IVA)
- Debt relief order (DRO)
- Equity release
- Debt arrangement scheme (DAS)

6.11 Where do you live?

- Rural area
- Suburban area
- Urban area, but not central city
- Central city

6.12 Do you own a home?

- Yes; the mortgage is paid off
- Yes; still some mortgage to pay off
- No

6.13 What is the outstanding balance of your mortgage?

- Less than £10,000
- £10,000 to less than £20,000
- £20,000 to less than £30,000
- £30,000 to less than £40,000
- £40,000 to less than £50,000
- £50,000 to less than £75,000
- £75,000 to less than £100,000
- £100,000 to less than £150,000
- £150,000 to less than £200,000
- £200,000 to less than £250,000
- £250,000 to less than £500,000

Financial stress and food insecurity among older adults

- £500,000 and higher

Please share your thoughts

At the end of this survey, we would like to inquire if you have any comments about financial difficulty in older age. We would really appreciate it if you left any comments below.