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Relations between longitudinal trajectories of subjective financial wellbeing with self-rated health among elderly

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ABSTRACT

Background and objective: The relationship between income and health in late life is well established, but the link between subjective financial wellbeing (SFW) and self-rated health (SRH) has been relatively ignored, especially among elderly in Europe. Adopting a longitudinal person-oriented analytical approach this study investigates the relationship between SFW and SRH in late life in Italy.

Materials and methods: Analysis of the European Statistics on Income and Living Conditions survey (EU-SILC) for the period 2010–2013 in Italy examined these relationships at ages 65–78 ($N = 1268$). Latent class growth analysis and growth mixture modeling were used to identify latent trajectories of SFW. Post hoc analysis of variance examined how SFW latent groups differed in terms of SRH across time.

Results: A three-group latent trajectory model fitted the data best. The three SFW groups were named average-decreasing ($n = 238$), low-stable ($n = 216$), and high-stable ($n = 814$). Repeated measures analysis of variance indicated a significant multivariate effect of SFW latent trajectory class on SRH, controlling for age, gender, and presence of chronic diseases. Post hoc analyses revealed that levels of SRH in the high-stable SFW group remained the highest compared to the other two groups and did not decrease over time, while the average-decreasing group showed a decrease in SRH levels.

Conclusions: Results suggest that in late life longitudinal negative changes in perceptions of financial wellbeing may occur together with decreases levels of self-reported health. Future research on health inequalities in elderly should pay specific attention to the link between financial wellbeing and health from a self-reported perspective.

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1. Introduction

The world economic crisis that has stricken Europe since 2008 is known to have brought severe challenges for the public health sectors of many countries, causing a reduction in public health budgets and an increase of healthcare costs for citizens [1-4]. Older portions of the population are likely to have experienced this trend more negatively than other age groups [5,6], not only because they are in higher need of healthcare assistance, but also given their higher exposure to a variety of social risk factors, including poverty, social exclusion and poorer health [7-9]. Indeed, the association between socioeconomic resources and health and its role in predicting mortality in late life is well known [10-12]. However, despite the increasing adoption of self-reported tools to measure wellbeing in health-related studies [13,14], the relationship between subjective financial wellbeing (SFW) and self-rated health (SRH) in late life has been relatively ignored [15], particularly among elderly in Europe. Nevertheless, we know how the progressive aging of the demographic population at the European level will represent one of the major public health challenges of the near future [16], in particular considering how the risk of poverty grows with older age [17]. Accordingly, the current study aims at analyzing through a longitudinal person-oriented statistical approach the overtime differences in SRH between latent trajectory groups of SFW in a national representative sample of Italian older adults aged 65-78. We did so using Italian national representative data from the European Statistics on Income and Living Conditions survey (EU-SILC) conducted by the Italian National Institute of Statistics (ISTAT) between 2010 and 2013. The timing and longitudinal design of this survey provide relevant information to investigate the relationship between financial wellbeing and health in late life from a self-perceived perspective in Italy. In fact, not only from 2007 to 2010 the average public healthcare expenditure growth rate in Italy was significantly smaller than in the 2001-2006 period (2.3% and 5.1%, respectively) [5], but according to a 2011 survey [18], a significant portion of Italian households declared to have reduced healthcare expenditures for reasons related to the financial crisis thus imposing health risks. Accordingly, to inform current and future public health steps more research is needed to evidence relationships between financial wellbeing and health among vulnerable portions of the populations such as the elderly.

1.1. Subjective financial wellbeing and self-rated health

Self-reported measures of wellbeing represent an opportunity to go beyond other indicators of progress and health in every society [19]. At this regard, subjective measures of financial condition and health have been extensively adopted in elderly research [20-23]. From a side, SFW better captures the meaning of income adequacy for individuals than other objectives measures of income [24]. More specifically, individuals are likely to perceive the adequacy of their income by comparing it to their reference group, so that such perceptions may vary between specific contexts, making self-reported measures more adapted to capture this variability [25]. From another

side, SRH has been found to be a strong predictor of a variety of health outcomes, from life expectancy to mortality, to the occurrence of chronic diseases [26,27]. However, despite the burgeoning number of studies looking at the correlation between socio-economic status and income with health in late life, fewer studies have explored this relationship adopting a self-reported perspective.

From a theoretical point of view, the connection between SFW and SRH may have a dual explanation. First, according to the reference group theory [25], social comparison may mediate between these two dimensions. Experiencing material deprivation in certain areas can nurture in fact the feeling of being unable to participate in ways seen as customary within a community or peer group, such as being able to afford a week's annual holiday or a dinner out once a week [28]. Second, individual perceptions of "financial strain" or "economic stress" may increase the risk of psychological distress symptoms such as anxiety or depression, thus affecting overall health [29-32]. In sum, low SFW can have negative impacts on health in a longitudinal perspective by causing a loss in sense of control, an increasing in hopelessness and demoralization feelings, and a decrease in self-confidence [31,32].

Despite all these evidences, by reviewing extant research literature on the relationship between SFW and SRH focusing on populations of older adults, it appears there are some major challenges to address. First of all, many studies are cross-sectional [33-36]. Moreover, longitudinal research is often limited to multivariate approaches [31]. In particular, very few studies have adopted a longitudinal person-oriented analytical perspective in this domain [37]. In this type of approach, the basic premise is that the population is heterogeneous in terms of the investigated phenomenon and its change [38,39]. Thus, the aim of the longitudinal person-oriented method is to capture this diversity by identifying clusters of individuals following a similar pattern of development over time. On the whole, this approach offers the opportunity to analyze interrelated longitudinal processes more dynamically. Here, by associating SRH outcomes with SFW classes, it is possible to ascertain whether changes in self-perceived economic conditions are immediately or eventually reflected in health outcomes. Accordingly, within the framework of the current study, two main hypotheses were formulated. First, based on previous studies [23,40] it was expected to find different trajectories of SFW as some individuals encounter stability over time while others may experience positive or negative changes. Second, higher positive subjective financial situation was hypothesized to be related to higher positive levels of self-perceived health [31,35].

2. Materials and methods

2.1. Sample

This paper used EU-SILC data collected by ISTAT for the period 2010-2013. The EU-SILC in Italy covers the Italian resident population in private households, using paper and pencil technique and a multi-stage stratified cluster sampling procedure. Since 2010 data collections took place annually

and in early 2015 ISTAT released the data for the first four waves [41].

According to the definition of an older adult given by the World Health Organization [42] this study was restricted to adult respondents aged 65 years and older that provided data pertaining to SRH and SFW across the four measurement points. This left a total of 1268 respondents for these analyses ($M_{\text{age}} = 72.76$; $SD = 4.53$; range = 65–78; % females = 58). The Italian context is in an interesting setting to study the dynamics between SFW and SRH among older adults. First of all, the Italian population is among the top 10 oldest in the world [43]. On top of this, Italy is expected to experience one of the largest growths in persons ≥ 65 years in the world ($>20\%$ by 2020) [43]. This fast population aging has social and economic consequences in particular regarding national expenditure for health services, especially if we consider the high percentage of older adults living alone in Italy (in 2014 the 49% of people living alone in Italy were older than 65) [44]. Thus, there is an impellent need to advise new welfare strategies to face present and forthcoming challenges in European contexts such as Italy.

2.2. Measures

SFW and SRH were both assessed through single questions, namely “Thinking of your household’s total income, is your household able to make ends meet, namely, to pay for its usual necessary expenses?” (1 = with great difficulty, 2 = with difficulty, 3 = with some difficulty, 4 = fairly easily, 5 = easily, 6 = very easily), and “How would you rate your health status?” (1 = very good, 2 = good, 3 = fair, 4 = bad, 5 = very bad). In addition, participants were asked whether they suffered from any chronic (long-standing) illness or condition (0 = no, 1 = yes), while gender was coded “0” for male and “1” for female, and age was treated as continuous.

2.3. Analysis

Group-based trajectory models are increasingly being applied in medical research to evidence heterogeneity in the developmental course of health-related outcomes [45]. The current study followed a three-step approach in which Latent Growth Curve Modeling first and group-based trajectory analysis techniques then were used to define different longitudinal groups of SFW so to ultimately observe whether these latent groups were differentially related to SRH outcomes over time. Each of these analytical steps is further described below.

2.4. Latent growth curve modeling

To examine how SFW changed during a 4-year period, latent growth curve modeling (LGCM) [46] was conducted to estimate the average initial level and slope of SFW among the overall sample. Reading from previous research [47], the following indicators were used to assess the goodness-of-fit of the estimated LGCM: (1) χ^2 test; (2) comparative fit index (CFI) with a cut-off value of ≥ 0.95 ; (3) Tucker–Lewis index (TLI) with a cut-off value of ≥ 0.95 ; (4) standardized root mean square residual (SRMR) with a cut-off value of ≤ 0.09 ; and (5) root mean square

error of approximation (RMSEA) with a cut-off value of ≤ 0.06 . In order to retain a model as ‘acceptable’, all the above mentioned thresholds of fit indexes must be met.

2.5. Group-based trajectory modeling

To evidence whether different types of SFW trajectories emerged from the total sample – given significant LGCM results at the previous analytical step – analyses were extended into latent class growth analysis (LCGA) and growth mixture modeling (GMM) [48]. Both LCGA and GMM are widely adopted types of analyses in longitudinal person-oriented statistical research. These analytical techniques aim at classifying individuals into distinct groups or categories based on individual response patterns so that individuals within a group are more similar than individuals between groups. Reading from Jung and Wickrama [49], LCGA and GMM can be used together to help better identifying latent developmental groups. More specifically, while in LCGA the variance and covariance estimates for the growth factors within each class are fixed to zero so to obtain homogeneity in individual growth trajectories within each class, in GMM these are freely estimated [49]. Accordingly, here LCGA was initially implemented to identify the number of distinct classes of SFW trajectories in the current sample, while GMM was subsequently used to refine the chosen class composition to estimate variance and covariance heterogeneity for the growth factors within classes. LCGA and GMM are exploratory techniques with no a priori assumptions about the exact number of classes to be estimated. When testing such models different class solutions are specified. The Akaike’s Information Criteria (AIC), Bayesian Information Criteria (BIC) and sample-size Adjusted BIC (aBIC) were the primary fit statistics used to determine the number of classes that best fitted the data, along with entropy, which gives an indication of the accuracy of latent class assignment for each respondent, and the size of the smallest latent class that was extracted [50]. Moreover, interpretability and theoretical justification of each latent class solution were also factors to take into consideration where deciding upon which solution to retain as the most plausible [51]. Smaller values of AIC, BIC and aBIC are preferred when choosing the number of latent classes [52]. Although there is no conventional level for the threshold value for entropy, values closer to 1 indicate greater accuracy of latent class assignment. Finally, very small classes ($<10\%$ of the total sample) may represent chance findings and thus give a false indication of the number of latent classes within the sample. Multiple random starts were used to avoid solutions based on local maxima, which would give a false sense of the number of latent classes in the data.

2.6. Analysis of variance

Repeated measures analysis of variance (ANOVA) and post hoc ANOVA were used to test whether the mean levels of SRH were significantly different between latent trajectories classes of SFW over time, controlling for age, gender, and presence of chronic diseases. Analyses were conducted with the Mplus 5.0 statistical software program [46]. The level of statistical significance was set at $P < 0.05$.

3. Results

3.1. Development of SFW

Results of LGCM across four waves indicated a significant negative change in SFW over time in the current sample, $\chi^2 = 8946.60(6)$, $P < 0.001$; CFI = 0.99; TLI = 0.98; SRMR = 0.06; RMSEA = 0.06. More specifically, mean and variance of both intercept (mean = 3.70, SE = 0.01; variance = 0.41, SE = 0.01) and slope (mean = -0.03, SE = 0.00; variance = 0.02, SE = 0.00) of SFW from Time 1 to Time 4 were significant at $P < 0.001$. These results indicate also that there is significant individual variance in the initial levels and in the rate of change. Thus, heterogeneity among individuals can be further investigated via LCGA and GMM.

3.2. Identifying SFW trajectories

LCGA was first used to identify sub-groups of individuals according to their SFW trajectories. Table 1 shows the fit indices and class frequencies for different latent class solutions. The four-class solution was considered not acceptable given the presence of a group with less than 10% of the

entire sample. The three-class solution was thus retained as the most optimal given the numerical balance between observed groups and the better fit indexes with respect to the two-class solution (i.e., smaller values of BIC, aBIC and AIC together with an Entropy score close to 1). These results were then revised through GMM to reassess all class solutions. Again, the three-class solution appeared the most acceptable one (Table 1). The three observed classes were named as follows: average-decreasing ($n = 238$; 19% of the total sample), low-stable ($n = 216$; 17%), and high-stable ($n = 814$; 64%). Fig. 1 displays the observed latent curves for the different trajectories of SFW while, Table 2 reports mean structure information for each class. Finally, Table 3 reports descriptive statistics and results of tests for significant differences between latent groups regarding age, gender, and presence of chronic diseases. According to post hoc ANOVA with Bonferroni adjustment, the high-stable group resulted the youngest group ($M_{\text{age}} = 71.94$, $SD = 4.50$) compared to the average-decreasing ($M_{\text{age}} = 74.52$, $SD = 4.18$) and the low-stable ($M_{\text{age}} = 73.95$, $SD = 4.21$) groups, which did not differ between each other. Chi-square tests also showed that females were overrepresented in the average-decreasing (63% within the group) and in the low-stable (66%) groups compared to the high-stable one (51%). Moreover, chronic diseases frequency at baseline was higher in the average-decreasing (78%) and in the

Table 1 – Fit indices and class frequencies based on estimated posterior probabilities for latent class growth models of subjective financial wellbeing with different numbers of latent trajectory groups (N = 1268).

Number of groups	BIC	aBIC	AIC	Entropy
Latent class growth analysis				
1	13623.27	13604.21	13592.40	–
2 ($n_1 = 39\%$, $n_2 = 61\%$)	12198.93	12170.34	12152.62	0.810
3 ($n_1 = 38\%$, $n_2 = 24\%$, $n_3 = 38\%$)	11955.53	11917.42	11893.79	0.727
4 ($n_1 = 30\%$, $n_2 = 37\%$, $n_3 = 25\%$, $n_4 = 8\%$)	11914.54	11866.89	11837.36	0.701
Growth mixture modeling				
1	11951.41	11922.82	11905.10	–
2 ($n_1 = 37\%$, $n_2 = 63\%$)	11900.70	11862.58	11838.96	0.621
3 ($n_1 = 19\%$, $n_2 = 17\%$, $n_3 = 64\%$)	11897.35	11849.71	11820.18	0.604
4 ($n_1 = 14\%$, $n_2 = 63\%$, $n_3 = 22\%$, $n_4 = 1\%$)	11902.39	11845.21	11809.78	0.697

Note: BIC, Bayesian information criteria; aBIC, adjusted Bayesian information criteria; AIC, Akaike information criteria.

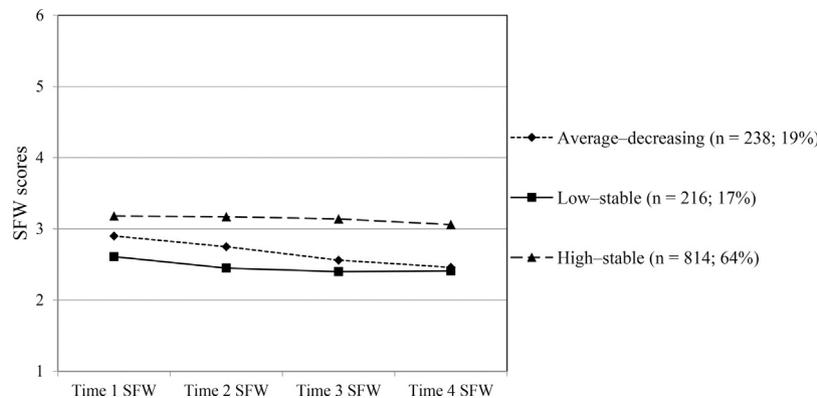


Fig. 1 – Observed subjective financial wellbeing (SFW) latent trajectories (N = 1268). Note: SFW was coded 1 = with great difficulty, 2 = with difficulty, 3 = with some difficulty, 4 = fairly easily, 5 = easily, 6 = very easily.

Table 2 – Estimation results of the final growth curve modeling with three latent trajectory groups (unstandardized estimates; N = 1268).

	Average-decreasing (n = 238; 19%)	Low-stable (n = 216; 17%)	High-stable (n = 814; 64%)
Mean structure			
Level	3.02 (0.18)*	2.05 (0.21)*	3.39 (0.04)*
Change	-0.36 (0.10)*	-0.00 (0.08)	0.00 (0.01)
Values are mean (standard error).			
* P < 0.001.			

Table 3 – Descriptive statistics and results of tests for significant differences between latent groups across age, gender, and presence of chronic diseases at baseline (N = 1268). Values are numbers (percentages) unless stated otherwise.

Variables	Average-decreasing (n = 238; 19%)	Low-stable (n = 216; 17%)	High-stable (n = 814; 64%)	P
Age, mean (SD), years	73.95 (4.21)	74.52 (4.18)	71.94 (4.50)	<0.001 ^a
Gender, n (%)				<0.001 ^b
Male	89 (37)	73 (34)	399 (49)	
Female	149 (63)	143 (66)	415 (51)	
Chronic diseases, n (%)				<0.001 ^b
Yes	106 (46)	181 (84)	257 (32)	
No	128 (54)	33 (16)	552 (68)	
^a Significant difference between groups according to ANOVA.				
^b Significant differences between groups according to χ^2 test.				

low-stable (83%) groups compared to the high-stable one (34%). Thus, in the subsequent analyses the effect of SFW latent trajectory membership on SRH was controlled for age, gender, and chronic diseases.

3.3. Differences in SRH across time

Repeated measures ANOVA was used to examine SRH mean differences between latent groups across time. Fig. 2 depicts patterns of change in SRH for trajectory groups over the same period. To ease interpretation, values of SRH were reverse-coded (i.e., higher scores meaning higher SRH). SFW class membership, [F(6, 2496) = 15.42, P < 0.001], gender [F(3, 1247) = 3.15, P < 0.05], and chronic diseases [F(6, 2496) = 4.33, P < 0.001], had a statistically significant effect on SRH levels. According to post hoc ANOVA and paired sample t-tests, levels of SRH in the high-stable group remained the highest compared to the other two groups and did not decrease over time as did the low-stable one (except for a significant decrease in SRH from Time 1 to Time 2, it remained stable from Time 2 to Time 4), while the average-decreasing group showed an overall constant decrease in SRH levels. In particular, the average-decreasing group showed significant higher mean levels of SRH compared to the low-stable group across the first three measurement points, while this relationship appeared reversed at Time 4. Table 4 reports descriptive statistics for SFW and SRH differences between classes across time. Overall, these results indicate that a longitudinal decrease in SFW at a group-level is associated with a decrease in SRH. More specifically, group-level differences in SFW are reflected in group-level differences in SRH across time.

4. Discussion

This study explored the relationship between SFW and SRH, while adjusting for age, gender, and chronic diseases, in an Italian national representative sample of individuals aged 65–78 and compared this relationship across time adopting a longitudinal person-oriented analytical approach. Two hypotheses were initially formulated: (1) based on previous studies [22,39], it was expected to find different trajectories of SFW as some individuals encounter stability over time while others may experience positive or negative changes; and (2) higher positive subjective financial situation is related to higher positive levels of self-perceived health [30,34]. The results confirmed both these hypotheses. Trajectories of SFW were associated with SRH over time in late life. In particular, deteriorating levels of SFW can be linked with a decreasing in SRH, while stability in SFW, either low or high, is reflected by stability in SRH over time. The finding that SFW is positively related to SRH in late life is in line with previous research [15,30]. More specifically, the current study is one of the very few studies [36] to show this relationship in a longitudinal person-oriented analytical perspective.

The characteristics of each observed latent group illustrate that a group-based trajectory analysis is an appropriate tool for depicting clusters of longitudinal self-reported outcomes from late life. In particular, the differences between observed groups according to age, gender, and chronic diseases as well as their differential associations with SFW and SRH across time reflect previous research findings. Indeed, in Europe women are more exposed to poverty in late life than men [53], while this risk

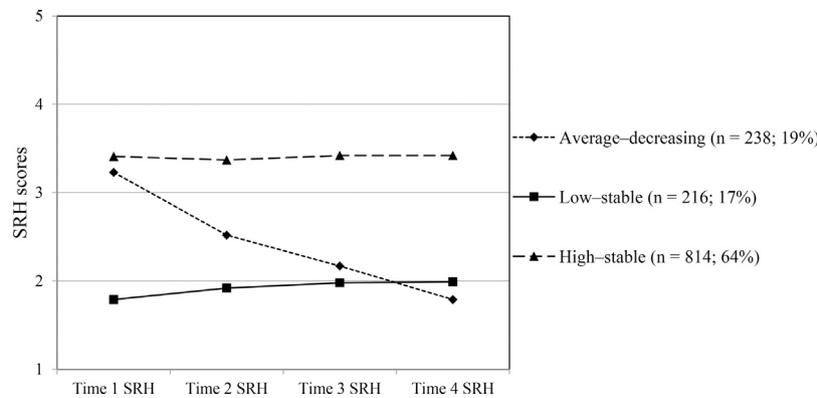


Fig. 2 – Patterns of self-rated health (SRH) across 4 years for subjective financial wellbeing latent trajectory groups (N = 1268). Note: Values of SRH were reverse-coded as 1 = very bad, 2 = bad, 3 = fair, 4 = good, 5 = very good.

Table 4 – Descriptive statistics for self-rated health (SRH) and subjective financial wellbeing (SFW) across SFW latent trajectory groups over time.

SFW latent trajectory groups	Self-rated health (SRH)			
	Time 1	Time 2	Time 3	Time 4
Average-decreasing (n = 238; 19%)	3.23 (0.54)	2.52 (0.78)	2.17 (0.73)	1.79 (0.47)
Low-stable (n = 216; 17%)	1.79 (0.55)	1.92 (0.74)	1.98 (0.67)	1.99 (0.71)
High-stable (n = 814; 64%)	3.41 (0.65)	3.37 (0.72)	3.42 (0.70)	3.42 (0.60)
	Subjective financial wellbeing (SFW)			
Average-decreasing (n = 238; 19%)	2.90 (1.08)	2.76 (1.08)	2.56 (1.01)	2.46 (0.95)
Low-stable (n = 216; 17%)	2.61 (1.05)	2.45 (1.00)	2.40 (.96)	2.41 (0.97)
High-stable (n = 814; 64%)	3.18 (1.10)	3.17 (1.01)	3.14 (1.05)	3.06 (1.01)

Values are mean (standard deviation).

increases with age for both genders [3]. Moreover, suffering from any chronic illness or condition increases the risk of experience financial stress and material deprivation among older adults [54]. This is especially true for the “super-utilizers” slice of the elderly population, namely the one composed by patients with multiple ambulatory care-sensitive chronic conditions that are consuming a rich portion of the medical resources [55]. In particular, cuts in public healthcare expenditure at the national level affect the most those households where a significant part of the income is spent for healthcare [56]. In the specific case of Italy, the high demand for home-based elder care and the low level of public service provision in this sector have pushed many Italian families to turn to migrant care workers to provide care to their frail older members [57]. This trend, which is currently taking place on a large scale in the rest of Europe [58] is therefore posing additional financial challenges for household budgets. On top of this, older adults in the current economic scenario are facing further economic difficulties, related to inadequate pension adjustment, lower purchasing power and increasing costs of living [59,60]. Thus, the connection between income and health in late life is likely to be multifaceted [15].

Overall, when reflecting upon the various aspects of the relationship between financial wellbeing and health in older adults, it is evident that this study had several limitations to be

mentioned. First, other indicators of financial wellbeing (e.g., income, quality of dwelling) and successful aging (e.g., cognitive function, health-related behaviors) were not included in the analyses since data were not available across all waves. From a longitudinal perspective, future studies should then examine more comprehensive models of economic deprivation among elderly and concurrently explain better detailed trajectories of health and quality of life. Second, the effects of time-varying covariates on SRH trajectories were not examined, and these effects should be addressed in future research. Third, due to limitations typical in analysis of secondary survey data, we cannot exclude possible misclassification biases within the self-reported data. Finally, given that the sample inclusion strategy was defined to include adult respondents aged 65 years and older that provided data pertaining to SRH and SFW across the four measurement points in order to reduce the dropout effect, the survivorship of the oldest individuals may have reasonably caused further biases in the interpretation of the results. Nevertheless, the description of longitudinal profiles of SFW in the present sample of Italian elderly adults and their immediate relations with SRH and socio-demographic differences add new insights into the discussion about financial wellbeing and health in late life and has implications for future research and healthcare strategies in large community settings.

5. Conclusions

The current study showed from a self-perceived perspective how longitudinal trajectories of financial strain are associated with health over time in late life. In particular, deteriorating levels of financial status may be associated to lower levels of SRH in a time frame as short as four years. Conversely, stable economic conditions, either low or high, may reflect stable health statuses across few years.

Conflict of interest

The author has no conflict of interest to declare.

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