



Longitudinal associations between social connections and subjective wellbeing in the English Longitudinal Study of Ageing

Journal:	<i>European Health Psychology Society</i>
Manuscript ID:	GPSH-2014-0131.R1
Manuscript Type:	Psychology and Health
Keywords:	social isolation, loneliness , subjective wellbeing, older adults, ELSA

SCHOLARONE™
Manuscripts

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Longitudinal associations between social connections and subjective wellbeing in the English Longitudinal Study of Ageing

Word count: 5323

Number of figures: 03

Number of tables: 03

Abstract

Objective: The role of social relationships in determining wellbeing may be particularly salient in ageing populations. There is only limited longitudinal research examining the relationship between different dimensions of social relationships and change in wellbeing over time. The present analysis explores the association between isolation, loneliness and two measures of subjective well-being over 6 years using data from the English Longitudinal Study of Ageing.

Design: Measures of social relationships were obtained at baseline and associations with wellbeing over the following 6 years were analysed using mixed models.

Main outcome measures: Hedonic and evaluative wellbeing assessed every 2 years over the 6-year period.

Results: Levels of wellbeing showed a U-shaped relationship with time. At baseline higher isolation and loneliness were associated with lower levels of hedonic and evaluative wellbeing. Individuals with high levels of isolation and loneliness initially showed a smaller decrease in evaluative wellbeing. The subsequent rise in wellbeing was however, also diminished in this group. In contrast, loneliness was not associated with rate of change in hedonic wellbeing, while high levels of isolation were associated with a sustained decrease in hedonic wellbeing.

Conclusion: Social isolation and loneliness show different associations with changes in evaluative and hedonic wellbeing over time.

Keywords: social isolation, loneliness, subjective wellbeing, older adults, ELSA

Introduction

Psychologists have long since been interested in understanding subjective wellbeing. Following the publication of the Stiglitz Commission report, which recommended complementing traditional drivers of policy-making such as GDP with indicators of national wellbeing, this has also gained attention from other disciplines and from policy makers (Stiglitz, Sen, & Fitoussi, 2009). This has led to increased efforts in the UK and worldwide in developing appropriate measures of wellbeing and in gaining an increased understanding of determinants of wellbeing. The world is also experiencing a major demographic shift, with an increase in the number of older adults. Over the next 20 years, England is expected to have a 39% increase in the population aged 65-84 years and a 106% increase in those aged 85 years and over (The King's Fund, 2013). Hence, understanding factors that affect the health and wellbeing of older adults is particularly important.

Wellbeing is a complex and multidimensional construct. Research in the area indicates 3 broad dimensions, including *evaluative or cognitive wellbeing* which refers to global evaluations of satisfaction with life in general or specific areas of one's life, *hedonic or affective wellbeing* which captures mood or feeling within a specific time period and *eudemonic well-being* which relates to satisfaction of basic psychological needs and self-determination (Dolan, Layard, & Metcalfe, 2011). While most studies focus on only a single aspect of wellbeing, it is clear that a consideration of these multiple dimensions is essential to gain a complete picture of an individual's state of wellbeing. Further, studies show that these dimensions may be associated with different predictors. A meta-analysis by Luhmann and colleagues showed that life events such as marriage and divorce have a greater effect on evaluative than on hedonic wellbeing, while the pattern of effects for events such as childbirth and employment differ for both forms of wellbeing (Luhmann, Hofmann, Eid, & Lucas, 2012). Analyses of Gallup data from 132 countries show that positive and negative feelings

1
2
3 were more strongly predicted by a consideration of whether participants' basic psychological
4 needs were met or not, while life evaluations showed stronger associations with material
5 wealth (Diener, Ng, Harter, & Arora, 2010).
6
7
8
9

10 Social relationships are found to be an important predictor of wellbeing across the
11 lifecourse (Diener & Seligman, 2002; Diener & Oishi, 2006), but may be particularly salient
12 for older adults (Bowling et al., 2003; Matheson, 2011). Social relationships include multiple
13 dimensions such as the size of individuals' social networks, frequency of contact with people
14 within the network, feelings of loneliness, or engagement in social activities. Older adults are
15 often at a greater risk of isolation and loneliness due to the many life changes that take place
16 in later life, including retirement, bereavement and children and friends moving away. Hence
17 our analysis focusses on the association of these variables with wellbeing in older adults.
18
19
20
21
22
23
24
25
26
27

28 Social isolation is an objective measure, incorporating aspects such as network size, diversity,
29 frequency of contact with network members and participation in social activities. Loneliness,
30 on the other hand, is a subjective assessment and relates to individuals' perceived levels of
31 isolation and satisfaction with existing relationships (Cornwell & Waite, 2009; de Jong
32 Gierveld & Havens, 2004).
33
34
35
36
37
38
39

40 Although interrelated, the association between these constructs is usually small to
41 moderate (Cornwell & Waite, 2009) and this association may be further attenuated in old age.
42 One reason is that older adults may be more prepared to cope with changes to their social
43 networks as they age, as many of these events are viewed as normal parts of ageing. Hence,
44 despite the changes to social network size or frequency of contact with certain members, they
45 may not feel lonely. While most research suggests that loneliness and social isolation are
46 detrimental to wellbeing (Dolan, Peasgood, & White, 2008), the association between social
47 relationships and wellbeing may also be more complex in older ages. Most Western countries,
48 including the UK and USA show a U-shaped association between age and different measures
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 of wellbeing with high levels of wellbeing in early adult life falling in the 40s and 50s before
4
5 rising into old age (Blanchflower & Oswald, 2008). However, studies of loneliness also
6
7 indicate a similar relationship with age, with teenagers and older adults reporting particularly
8
9 high levels of loneliness, and low levels seen in middle age (Victor & Yang, 2011). On the
10
11 other hand, analyses by the New Economics Foundation suggest that while satisfaction with
12
13 life is generally low, satisfaction with personal relationships is high in older adults
14
15 (Michaelson, Abdallah, Steur, Thompson, & Marks, 2008), while other work shows that older
16
17 adults may have more positive ties when compared with younger groups (Fingerman &
18
19 Charles, 2010). In an analysis using the National Social Life, Health, and Aging Project
20
21 (NSHAP) data, Cornwell and colleagues found that reported closeness to network members
22
23 and the number of non-primary ties decreased, while certain aspects of social participation
24
25 increased in older adults. The authors suggest that lower levels of closeness may be associated
26
27 with decreased frequency of contact with network members (Cornwell, Laumann, &
28
29 Schumm, 2008).
30
31
32
33

34
35 Socioemotional selectivity theory (SST) (Carstensen, Isaacowitz, & Charles, 1999)
36
37 provides a framework for us to consider why isolation and loneliness may affect wellbeing in
38
39 older age. According to SST, individuals' perception of time affects the emphasis they place
40
41 on different goals. This differing emphasis, in turn, has implications for the nature of social
42
43 interactions chosen to achieve these goals. In particular, older age is associated with a view of
44
45 time as being limited and thus goals associated with emotion regulation are prioritised. This
46
47 leads to a greater focus on close established relationships at the expense of network diversity.
48
49 However, close relationships fail to meet expectations and are unsatisfying, may cause
50
51 distress and be associated with lower levels of wellbeing. Thus we might expect that
52
53 dissatisfaction with relationships or loneliness, rather than social isolation, would be
54
55 particularly detrimental to wellbeing. It is unclear, however, whether the effects are likely to
56
57
58
59
60

1
2
3 be similar for hedonic wellbeing and evaluative wellbeing. Given the increasing emphasis on
4
5 close ties, we may expect that dissatisfaction with these ties may cause individual to evaluate
6
7 their lives less favourably over time. But, in line with Diener et al.'s (2010) findings, it is
8
9 possible that older adults consider other factors when evaluating their life, or that feelings of
10
11 loneliness are actually more situational with limited effect on global life satisfaction.
12
13 Similarly, hedonic wellbeing like loneliness also has an affective dimension and hence,
14
15 loneliness may be more important for hedonic wellbeing. Unsatisfying close ties and potential
16
17 difficulties with forming new ties in older age may have a sustained effect on enjoyment of
18
19 life. We aimed to examine this in a sample of older adults, using data from the English
20
21 Longitudinal Study of Ageing (ELSA).
22
23
24

25
26 It must be noted that much of the research into social networks and subjective
27
28 wellbeing is limited by its cross-sectional nature which offers us little understanding of how
29
30 the wellbeing changes and how social relationships may affect wellbeing over time. To
31
32 address this, we analysed data over a 6-year period and used mixed models for analysis. The
33
34 choice of mixed models also enabled us to deal with selective loss of data and different
35
36 patterns of missingness, which is a common problem in many longitudinal studies. Such
37
38 models offer a further advantage over traditional linear regression techniques in that they
39
40 enable us to determine the trajectory of change in outcome over time (Singer & Willett,
41
42 2003). While we expected that both isolation and loneliness would be related to baseline
43
44 levels of wellbeing, we hypothesized that loneliness rather than isolation would be associated
45
46 with changes in wellbeing over time. We did not make any specific predictions regarding
47
48 different effects for the evaluative and hedonic wellbeing.
49
50
51
52
53
54
55

56 **Methods**

57
58
59
60

Participants

Data were obtained from waves 2 to 5 of the English Longitudinal Study of Ageing (ELSA). ELSA is a nationally representative panel study of individuals aged 50 years and over. Fieldwork for the first wave of ELSA was carried out in 2002/3 with follow-ups every 2 years. Further details regarding sampling and data collection are available elsewhere (Banks, Breeze, Lessof, & Nazroo, 2006; Marmot, Banks, Blundell, Lessof, & Nazroo, 2003). Wave 2 of ELSA was the first wave to include a measure of loneliness and hence is used as the baseline for these analyses. When compared with the wave 1 sample, those from wave 2 who were included in this analysis were younger (mean age 64.0 years versus 67.9 years, $p < 0.001$, $d = 0.4$) and reported higher levels of hedonic wellbeing (mean score 13.5 versus 13.1, $p < 0.001$, $d = 0.2$). They were also more likely to be in the top quintile of wealth (22.9% versus 15.%, $p < 0.001$, Cramer's $V = 0.2$) and less likely to suffer from a limiting long-standing illness (31.7% versus 43.5%, $p < 0.001$, Cramer's $V = 0.1$).

Follow-up data on measures of wellbeing were obtained at waves 3 (2006/7), 4 (2008/9) and 5 (2010/11). The present analysis included 7724 participants at baseline. Four thousand and fifty eight participants had provided data at every wave and 6484 participants had data at at least one other wave. In general, participants who drop out between ELSA waves have been shown to be less healthy, wealthy, socially connected, and more lonely than those who remain in the study (Scholes, Taylor, Cheshire, Cox, & Lessof, 2008; Shankar, McMunn, Banks, & Steptoe, 2011; Shankar, Hamer, McMunn, & Steptoe, 2013) and report poorer wellbeing.

Measures

1
2
3 An index of *social isolation* was computed, based on not living with a partner (scored
4 as 1), not belonging to any organisations, clubs or religious groups (scored as 1), and having
5 less than monthly contact with friends, family or children (each scored as 1). Scores on the
6 index ranged from 0 to 5, with higher scores indicative of a greater degree of isolation
7 (Shankar et al., 2011).
8
9

10
11
12
13
14
15 *Loneliness* was measured using the short form the revised UCLA Loneliness scale
16 (Hughes, Waite, Hawkley, & Cacioppo, 2004). The scale consists of 3 items. Responses to the
17 items were summed and scores on this scale ranged from 3 to 9, with higher scores indicating
18 greater loneliness. The scale showed strong positive correlations with the full UCLA
19 loneliness scale and moderate correlations with negative emotions and perceived stress
20 (Hughes et al., 2004). The scale showed acceptable internal reliability (Cronbach's $\alpha = 0.82$).
21
22
23
24
25

26
27
28
29 Identical measures of wellbeing were obtained at baseline and at each of the follow-
30 ups.
31
32

33
34
35 *Hedonic wellbeing* was measured using the 4-item pleasure subscale of the CASP
36 quality of life questionnaire (Hyde, Wiggins, Higgs, & Blane, 2003). An example of a typical
37 item would be '*I enjoy the things I do*' with response options *Never, Not often, Sometimes* and
38 *Often*. Responses were summed to form the enjoyment of life scale, which has been shown to
39 predict all-cause mortality in older adults (Stephoe & Wardle, 2012). Scores ranged from 0 to
40 12, with higher scores indicating greater enjoyment of life (Cronbach's α ranged from 0.65 to
41 0.70 across the 4 waves).
42
43
44
45
46
47
48

49
50
51 *Evaluative wellbeing* was measured using the Diener Life Satisfaction scale (Diener,
52 Emmons, Larsen, & Griffin, 1985; Pavot & Diener, 1993). The scale consists of 5 items
53 examining how satisfied the individual is with his/her life, with response options on a 7-point
54 scale ranging from *Strongly disagree* to *Strongly agree*. An example of a typical item would
55
56
57
58
59
60

1
2
3 be '*In most ways my life is close to my ideal*'. Responses were reversed and summed so scores
4
5 ranged from 0 to 30, with higher scores indicating greater satisfaction with life (Cronbach's α
6
7 = 0.89 at each wave).
8
9

10 11 12 13 Covariates

14
15
16 Details on gender and age were obtained in the interview. Total (non-pension) wealth
17
18 was used as a measure of socioeconomic status, and was divided into quintiles for the
19
20 purposes of analysis. Participants were also asked if they had any long-standing health
21
22 condition and if it limited their activities. Based on their responses, participants were
23
24 classified as having a limiting long-standing illness or not (McMunn, Hyde, Janevic, &
25
26 Kumari, 2003). Previous research shows that these variables are closely associated with
27
28 isolation and loneliness (Shankar et al., 2011) and are also key determinants of wellbeing in
29
30 older adults (Dolan et al., 2008).
31
32
33
34
35
36
37

38 Statistical analysis

39
40
41 Participants were included in the analytical sample for each wave as long as they had
42
43 responded to at least one item on the life satisfaction or the enjoyment of life questionnaire at
44
45 that wave. Item-wise missing values on covariates, predictors and measures of wellbeing,
46
47 were imputed (for variables imputed: median percentage missing = 1.33; mean = 1.54;
48
49 maximum = 3.12). Following this, mixed models (Singer & Willett, 2003) were used to
50
51 analyse the effect of social isolation and loneliness at baseline on changes in enjoyment of life
52
53 and life satisfaction over the 6-year period. As scores on both isolation and loneliness were
54
55 positively skewed, scores were categorised. Individuals were classified as reporting high
56
57
58
59
60

1
2
3 (score of 0), intermediate (score of 1) and low levels of isolation (score of 2 and over),
4
5 roughly corresponding to tertiles of isolation. Two groups were formed for loneliness,
6
7 corresponding to those who reported never being lonely (score of 3) and those who reported
8
9 being lonely some or all of the time (scores greater than 3). Wave, centred at the first wave,
10
11 was used as a metric of time. Alternative functional forms were explored for the time metric
12
13 and the best fitting model was chosen using Akaike's Information Criterion. Based on this,
14
15 both a linear and a quadratic term were retained for time. The linear term for time corresponds
16
17 to instantaneous rate of change, while the quadratic term corresponds to the acceleration or
18
19 deceleration in growth over time (Holt, 2008). The final analysis reports a total of 4 models,
20
21 with two each for evaluative wellbeing and hedonic wellbeing. The main predictor (isolation
22
23 or loneliness) and its interactions with time were considered along with adjustment for all
24
25 covariates. Models of isolation were adjusted for loneliness categories and vice versa. All
26
27 analyses were adjusted for age, gender, limiting long-standing illness and wealth. Analyses
28
29 were carried out using SAS v.9.3 and PASW 21.
30
31
32
33
34
35
36
37

38 **Results**

39
40 Table 1 indicates characteristics of participants at baseline. Mean age of the
41
42 participants was just over 66 years at baseline, and more than half the participants were
43
44 women. Over a third reported having a limiting long-standing illness. Scores on the
45
46 enjoyment of life and the life satisfaction scale were negatively skewed. Mean scores at
47
48 follow-up (not presented here) indicated a small drop in scores on wellbeing at the first
49
50 follow-up but then showed increases at subsequent follow-ups.
51
52
53
54
55
56
57

58 *Changes in wellbeing over time*

1
2
3 In models for hedonic and evaluative wellbeing including only an intercept and linear
4 and quadratic time terms, the linear term for time was significant and negative ($B = -0.25$,
5 95%CI: -0.29 to -0.21 for hedonic wellbeing; $B = -1.24$, 95%CI: -1.39 to -1.11 for evaluative
6 wellbeing) suggesting an instantaneous fall in scores for both measures of wellbeing. The
7 quadratic term, however, was positive ($B = 0.05$, 95%CI: 0.04 to 0.07 for hedonic wellbeing;
8 $B = 0.38$, 95%CI: 0.33 to 0.42 for evaluative wellbeing) suggesting that this drop is not
9 maintained and an acceleration in wellbeing scores takes place over time. Figure 1 (a & b)
10 show the unadjusted changes in scores on wellbeing over time.
11
12
13
14
15
16
17
18
19
20
21
22
23

24 *Social isolation and wellbeing*

25
26
27 In analyses adjusted only for age, gender and the time parameters, greater isolation
28 was associated with lower levels of hedonic wellbeing (when compared with the low isolation
29 group, $B = -0.36$, 95%CI: -0.44 to -0.27 for the intermediate isolation group and $B = -0.97$,
30 95%CI: -1.06 to -0.88 for the high isolation group) and lower evaluative wellbeing (when
31 compared with the low isolation group, $B = -1.44$, 95%CI: -1.74 to -1.15 for the intermediate
32 isolation group and $B = -3.36$, 95%CI: -3.67 to -3.06 for the high isolation group). In fully
33 adjusted models including the interaction with the time parameters, the interaction of social
34 isolation with the linear time parameter was significant for both models (Table 2) such that
35 individuals in the highest isolation category showed a smaller instantaneous drop in scores on
36 wellbeing when compared to those in the low isolation group. No significant difference was
37 seen between the low and intermediate isolation groups. The interaction with the quadratic
38 time parameter was also significant, although in the opposite direction, suggesting that the
39 rate of change over time for the high isolation group was diminished compared with other
40 groups.
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 Figure 2 (a & b) illustrate the association of baseline social isolation with changes in
4 scores on wellbeing. Individuals in the low isolation group showed the highest levels of
5 wellbeing, while those in the high isolation group showed the lowest levels of wellbeing. All
6 groups showed an initial drop in levels of wellbeing, although this drop was less pronounced
7 among individuals with the highest levels of isolation. For individuals with low or medium
8 isolation, scores on life satisfaction and enjoyment of life then increased. In contrast, the high
9 isolation group showed a sustained decline on scores of enjoyment of life and only a small
10 rise on scores of life satisfaction.
11
12
13
14
15
16
17
18
19
20
21
22
23

24 *Loneliness and wellbeing*

25
26
27 Individuals who reported being lonely some or all of the time reported poorer initial
28 wellbeing (for those who reported being lonely some or all of the time $B = -1.18$, 95%CI: -
29 1.25 to -1.12 for enjoyment of life and $B = -4.43$, 95%CI: -4.66 to -4.20 for evaluative
30 wellbeing, when compared with those who were never lonely; analyses adjusted for age,
31 gender and time parameters only). In models including the interaction with time and other
32 covariates (see Table 3), the loneliness x time interaction was non-significant in the model for
33 hedonic wellbeing, as was the loneliness x time² interaction, indicating that loneliness was not
34 associated with a change in scores on hedonic wellbeing over time. However, in the model for
35 evaluative wellbeing, the loneliness x time interaction was significant, such that individuals
36 who reported being lonely some or all of the time showed a smaller initial decrease in scores
37 on life satisfaction. As with the model for social isolation, however, the loneliness x time²
38 interaction was significant and indicated that the rate of growth for the lonely group at later
39 assessments was smaller.
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 As seen in Figure 3(b), individuals who reported never feeling lonely had higher levels
4 of evaluative wellbeing at baseline. They initially showed a more rapid rate of decline but
5 then showed a sharper increase when compared to those who reported feeling lonely some or
6 all of the time. In contrast, the scores for hedonic wellbeing show a similar U-shaped curve
7 for both groups. Individuals with high levels of loneliness show consistently lower levels of
8 hedonic wellbeing.
9
10
11
12
13
14
15

16
17 Repeating the analysis with continuous values on isolation (log-transformed) and
18 loneliness (reflected and inversed) let to substantively similar findings.
19
20
21
22
23
24

25 Discussion

26
27
28 Levels of wellbeing in this sample of individuals aged 52 years and above were high.
29 Over a 6-year period, wellbeing showed an initial drop but then increased. This supports
30 previous research showing increases in wellbeing after the age of 50 in most developed
31 nations (Deaton, 2010).
32
33
34
35
36
37

38 Our analyses show that social isolation and loneliness were associated with poorer
39 wellbeing at baseline in older adults. Both isolation and loneliness were associated with
40 changes in the trajectory of evaluative wellbeing over time. Contrary to expectations, the
41 initial decrease in evaluative wellbeing was actually lower among those with high levels of
42 isolation or loneliness. The subsequent increase in wellbeing was, however, diminished in
43 these groups. Individuals in the high isolation and high loneliness group already reported
44 lower levels of evaluative wellbeing when compared with those who were less isolated or
45 lonely. It must be noted, however, that the scores on wellbeing for this group were still
46 towards the upper end of the scale and this is unlikely to be indicative of a floor effect. This
47 may be explained by a number of factors. Firstly, it may indicate that older adults adapt to
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 having poorer social relationships. While this does affect overall levels of wellbeing relative
4
5 to those with more social relationships, when evaluating their life these individuals may focus
6
7 on other factors. Older adults have also been shown to focus on more positive information in
8
9 attention and memory, and disregard negative information to promote greater wellbeing, i.e.
10
11 the positivity effect (Reed & Carstensen, 2012). A further explanation is this may reflect the
12
13 importance of other factors such as material resources in determining evaluative wellbeing
14
15 (Diener et al., 2010). In contrast, those in the low isolation and low loneliness categories
16
17 experienced the expected increases in wellbeing that are usually found with ageing. In line
18
19 with SST, the general pattern of increase in wellbeing in older age may be attributed the
20
21 nature of emotional self-regulation on older age (Cartensen et al., 1999). For low isolation and
22
23 low loneliness groups, close and satisfying ties as well as a larger network are likely to
24
25 provide positive associations and memories. The importance attached to these may increase
26
27 over time leading to sustained increases in wellbeing.
28
29
30
31

32
33 In accordance with our hypothesis, loneliness at baseline was associated with lower
34
35 hedonic wellbeing. However, it showed no significant effect on the trajectory of hedonic
36
37 wellbeing. Both high and low loneliness groups followed a similar trajectory of initial
38
39 decrease in enjoyment of life followed by an increase, with the high loneliness group
40
41 reporting consistently lower levels of wellbeing when compared with the low loneliness
42
43 group. In contrast, increased isolation was associated with poorer hedonic wellbeing at
44
45 baseline and with sustained decreases in hedonic wellbeing over the 6-year period. Contact
46
47 with a wider group of people, even those who may not be particularly close, may help
48
49 individuals to gain knowledge, information and other practical skills which may promote
50
51 increased wellbeing. A recent study showed that a greater number of daily interactions with
52
53 others, even those who were not close network members was associated with higher levels
54
55 wellbeing (Sandstrom & Dunn, 2014). Thus even casual, daily interactions with others have
56
57
58
59
60

1
2
3 the power to influence wellbeing. Further, it has been suggested that hedonic wellbeing acts
4
5 as a marker of underlying health-related or dispositional processes (Steptoe & Wardle, 2012).
6
7 Hedonic wellbeing has been found to be associated with poorer health, such that individuals
8
9 who reported greater enjoyment of life (a measure of hedonic wellbeing) were less likely to
10
11 develop limitations in activities of daily living and incident coronary heart disease (Steptoe,
12
13 Demakakos, & de Oliveira, 2012). Sustained effects of social isolation on hedonic wellbeing
14
15 may be associated with these health-related factors. Efforts to improve social integration
16
17 among older adults may have substantial benefits for health and wellbeing.
18
19

20
21 Our results also offer some support to recent work examining the effects of structural
22
23 and functional measures of social relationships on health and wellbeing. Isolation is a
24
25 structural measure, while loneliness could be regarded as a functional measure. Huxhold and
26
27 colleagues found that only structural measures of social relationships were associated with
28
29 increases in positive affect over time, while both structural and functional measures
30
31 (emotional support) were associated with changes in life satisfaction (Huxhold, Fiori, &
32
33 Windsor, 2013). The authors also found that changes in emotional support over time were
34
35 associated with decreases in negative affect but not positive affect. This suggests that
36
37 functional measures may play a stronger role in alleviating unpleasant mood states rather than
38
39 promoting positive ones. Our analyses did not examine a measure of negative affect and this
40
41 represents an interesting avenue for future work.
42
43
44

45 46 47 *Strengths and limitations*

48
49 A major strength of this analysis was the ability to examine changes in wellbeing over
50
51 a period of 6-years using a large sample of older adults. A further strength of ELSA is the
52
53 availability of multiple measures of wellbeing as well as of social connections and hence we
54
55 were able to compare changes in two measures of wellbeing and examine their relationships
56
57
58
59
60

1
2
3 with two measures of social relationships. The use of mixed models also allowed us to deal
4
5 with dropout and different patterns missingness in longitudinal data by using all the data
6
7 provided by participants. However, we were unable to account for dropout between waves 1
8
9 and 2 of ELSA and we did not include participants who failed to complete the self-completion
10
11 questionnaires at follow-up. Participants who dropped out following wave 1 were in poorer
12
13 health and of a lower socioeconomic status and our analysis revealed small to moderate levels
14
15 of selectivity. The measure of hedonic wellbeing used in this analysis also showed low levels
16
17 of internal reliability which may be cause for concern.
18
19

20
21 Naturally feelings of loneliness and levels of isolation are likely to change over time
22
23 and in response to life events and as noted earlier, this may be particularly true for older
24
25 adults. The present study examined measures of isolation and loneliness at a single point in
26
27 relation to changes in wellbeing over time and further research could examine dynamic
28
29 changes in wellbeing in response to changes in isolation and loneliness. Further, specific
30
31 aspects of social networks may change in old age with increases in activities such as religious
32
33 participation or volunteering but decreases in network size (Cornwell et al., 2008). As with
34
35 isolation and loneliness, these specific dimensions of social isolation may affect wellbeing
36
37 differentially and future research could consider these aspects separately.
38
39
40
41

42 *Conclusion*

43
44
45 Social isolation and loneliness show different associations with changes in evaluative
46
47 and hedonic wellbeing over time. Interventions to improve the social networks of older adults
48
49 are likely to be beneficial in improving hedonic wellbeing, while efforts to change evaluation
50
51 of life are likely to require a greater consideration of other factors such as material resources.
52
53
54
55
56
57
58
59
60

Reference List

1
2
3
4
5
6
7 Banks, J. A., Breeze, E., Lessof, C., & Nazroo, J. (2006). *Retirement, health and*
8
9 *relationships of the older population in England: The 2004 English Longitudinal Study of*
10
11 *Ageing (Wave 2)*. London: The Institute for Fiscal Studies.

12
13
14
15 Blanchflower, D. G. & Oswald, A. (2008). Is well-being U-shaped over the life cycle?
16
17 *Social Science & Medicine*, 66, 1733-1749.

18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
Bowling, A., Gabriel, Z., Dykes, J., Down, L. M., Evans, O., Fleissig, A. et al. (2003).
Let's ask them: a national survey of definitions of quality of life and enhancement among
people aged 65 and over. *International Journal of Ageing and Human Development*, 56, 269-
306.

Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously:
A theory of socioemotional selectivity. *American Psychologist*, 54, 165-181.

Cornwell, B., Laumann, E. O., & Schumm, L. P. (2008). The Social Connectedness of
Older Adults: A National Profile. *American Sociological Review*, 73, 185-203.

Cornwell, E. & Waite, L. (2009). Social Disconnectedness, Perceived Isolation, and
Health among Older Adults. *Journal of Health and Social Behavior*, 50, 31-48.

de Jong Gierveld, J. & Havens, B. (2004). Cross-national comparisons of social
isolation and loneliness: introduction and overview. *Canadian Journal of Aging*, 23, 109-113.

Deaton, A. (2010). Income, ageing, health and well-being around the world: Evidence
from the Gallup World Poll. In D.A.Wise (Ed.), *Research findings in the economics of ageing*
(pp. 235-263). The University of Chicago Press.

1
2
3 Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with
4 life scale. *Journal of Personality Assessment*, 49, 71-75.

5
6
7
8 Diener, E., Ng, W., Harter, J., & Arora, R. (2010). Wealth and happiness across the
9 world: Material prosperity predicts life evaluation, whereas psychosocial prosperity predicts
10 positive feelings. *Journal of Personality & Social Psychology*, 99, 56-61.

11
12
13 Diener, E. & Oishi, S. (2006). The nonobvious social psychology of happiness.
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
Psychological Inquiry, 16, 162-167.

Diener, E. & Seligman, M. E. P. (2002). Very happy people. *Psychological Science*,
13, 80-83.

Dolan, P., Layard, R., & Metcalfe, R. (2011). *Measuring subjective well-being for
public policy*. ONS Report.

Dolan, P., Peasgood, T., & White, M. (2008). Do we really know what makes us
happy? A review of the economic literature on the factors associated with subjective well-
being. *Journal of Economic Psychology*, 29, 94-122.

Fingerman, K. L. & Charles, S. T. (2010). It Takes Two to Tango: Why Older People
Have the Best Relationships. *Current Directions in Psychological Science*, 19, 172-176.

Holt, J. (2008). Modeling growth using multilevel and alternative approaches. In
A.A.O'Connell & D. B. McCoach (Eds.), *Multilevel modeling of educational data* (pp. 111-
159). Information Age Publishing Inc.

Hughes, M. E., Waite, L. J., Hawkey, L. C., & Cacioppo, J. T. (2004). A Short Scale
for Measuring Loneliness in Large Surveys: Results From Two Population-Based Studies.
Research on Aging, 26, 655-672.

1
2
3 Huxhold, O., Fiori, K. L., & Windsor, T. D. (2013). The dynamic interplay of social
4 network characteristics, subjective well-being, and health: The costs and benefits of socio-
5 emotional selectivity. *Psychology and Aging*, 28, 3-16.
6
7

8
9
10 Hyde, M., Wiggins, R. D., Higgs, P., & Blane, D. B. (2003). A measure of quality of
11 life in early old age: The theory, development and properties of a needs satisfaction model
12 (CASP-19). *Aging & Mental Health*, 7, 186-194.
13
14

15
16
17 Luhmann, M., Hofmann, W., Eid, M., & Lucas, R. E. (2012). Subjective well-being
18 and adaptation to life events: A meta-analysis. *Journal of Personality and Social Psychology*,
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

15 Marmot, M., Banks, J. A., Blundell, R., Lessof, C., & Nazroo, J. (2003). *Health,
wealth and lifestyles of the older population in England: The 2002 English Longitudinal
Study of Ageing*. London: The Institute for Fiscal Studies.

33 Matheson, J. (2011). *Measuring what matters: National statistician's reflections on
the national debate on measuring national well-being*. ONS Report.

38 McMunn, A., Hyde, M., Janevic, M., & Kumari, M. (2003). Health. In M.Marmot, J.
40 A. Banks, C. Lessof, & J. Nazroo (Eds.), *Health, wealth and lifestyles of the older population
in England: The 2002 English Longitudinal Study of Ageing* (London: The Institute for Fiscal
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
Studies.

48 Michaelson, J., Abdallah, S., Steur, N., Thompson, S., & Marks, N. (2008). *National
accounts of well-being: brining real wealth onto the balance sheet*. London: new economics
50
51
52
53
54
55
56
57
58
59
60
foundation.

1
2
3 Pavot, W. & Diener, E. (1993). Review of the satisfaction with life scale.
4
5 *Psychological Assessment*, 5, 164-172.
6
7

8
9 Reed, A. E. & Carstensen, L. L. (2012). The theory behind the age-related positivity
10
11 effect. *Frontiers in Psychology*, 3.
12

13
14 Sandstrom, G. M. & Dunn, E. W. (2014). Social Interactions and Well-Being: The
15
16 Surprising Power of Weak Ties. *Personality and Social Psychology Bulletin*.
17

18
19 Scholes, S., Taylor, R., Cheshire, H., Cox, K., & Lessof, C. (2008). *Retirement, health*
20
21 *and relationships of the older population in England: The 2004 English Longitudinal Study of*
22
23 *Ageing Technical Report* National Centre for Social Research.
24

25
26
27 Shankar, A., Hamer, M., McMunn, A., & Steptoe, A. (2013). Social Isolation and
28
29 Loneliness: Relationships With Cognitive Function During 4 Years of Follow-up in the
30
31 English Longitudinal Study of Ageing. *Psychosomatic Medicine*, 75, 161-170.
32

33
34 Shankar, A., McMunn, A., Banks, J., & Steptoe, A. (2011). Loneliness, social
35
36 isolation and behavioral and biological health indicators and older adults. *Health Psychology*.
37

38
39 Singer, J. & Willett, J. (2003). *Applied longitudinal data analysis*. Oxford: Oxford
40
41 University Press.
42

43
44
45 Steptoe, A., Demakakos, P., & de Oliveira, C. (2012). The psychological well-being,
46
47 health and functioning of older people in England. In J.Banks, J. Nazroo, & A. Steptoe (Eds.),
48
49 *The dynamics of ageing: Evidence from the English Longitudinal Study of aGEING 2002-*
50
51 *2010 (Wave 5)* (pp. 98-182). London: Institute for Fiscal Studies.
52

53
54
55 Steptoe, A. & Wardle, J. (2012). Enjoying Life and Living Longer. *Archives of*
56
57 *Internal Medicine*, 172, 273-275.
58
59
60

1
2
3 Stiglitz, J. E., Sen, A., & Fitoussi, J.-P. (2009). *Report by the commission on*
4
5 *measurement of economic performance and social progress.*
6

7
8 The King's Fund (2013). Future trends: Demography.
9

10
11 Victor, C. R. & Yang, K. (2011). The Prevalence of Loneliness Among Adults: A
12
13 Case Study of the United Kingdom. *The Journal of Psychology*, 146, 85-104.
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Table 1. Characteristics of study population

Variables	Baseline sample (N = 7724)
Age – Mean (SD)	66.4 (9.7)
Men (%)	44.8
Limiting long-standing illness (%)	34.6
Social isolation categories (%)	
Low	30.1
Intermediate	36.8
High	33.1
Loneliness categories (%)	
Low	53.3
High	46.7
Enjoyment of life – Mean (SD)	10.0 (1.8)
Life satisfaction – Mean (SD)	21.2 (6.1)

Table 2. Social isolation as a predictor of changes in wellbeing^a

	Enjoyment of life	Life satisfaction
	B (95% CI)	B (95% CI)
Social isolation		
Low	Reference	Reference
Medium	-0.14 (-0.23 to -0.05)	-0.73 (-1.04 to -0.43)
High	-0.56 (-0.67 to -0.48)	-2.08(-2.39 to -1.77)
Social isolation x Time		
Low	Reference	Reference
Medium	-0.03 (-0.14 to 0.07)	0.03 (-0.31 to 0.37)
High	0.14 (0.03 to 0.25)	0.46 (0.11 to 0.91)
Social isolation x Time ²		
Low	Reference	Reference
Medium	0.01 (-0.03 to 0.04)	-0.002 (-0.11 to 0.11)
High	-0.05 (-0.08 to -0.01)	-0.12 (-0.24 to -0.01)

^aAnalyses were adjusted for time, time², age, wave*age, gender, limiting long-standing illness, quintile of wealth and loneliness category.

Table 3. Loneliness as a predictor of changes in wellbeing^b

	Enjoyment of life	Life satisfaction
	B (95% CI)	B (95% CI)
Loneliness		
Never lonely	Reference	Reference
Sometimes/Always lonely	-0.97 (-1.04 to -0.89)	-4.12 (-4.37 to -3.86)
Loneliness x Time		
Never lonely	Reference	Reference
Sometimes/Always lonely	0.08 (-0.02 to 0.17)	0.89 (0.60 to 1.17)
Loneliness x Time²		
Never lonely	Reference	Reference
Sometimes/Always lonely	-0.01 (-0.04 to 0.02)	-0.17 (-0.26 to -0.07)

^bAnalyses were adjusted for time, time², age, gender, limiting long-standing illness, quintile of wealth and isolation category.

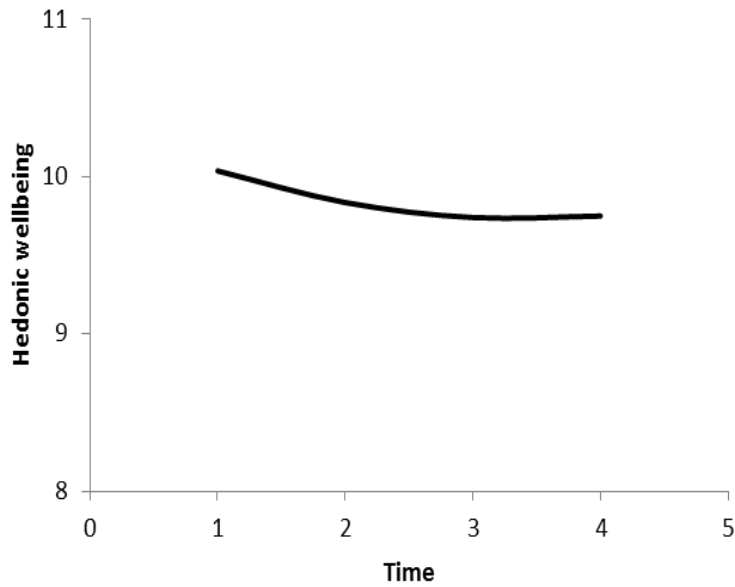
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Figure 1. Changes in scores for hedonic wellbeing (a) and evaluative wellbeing (b) over time.

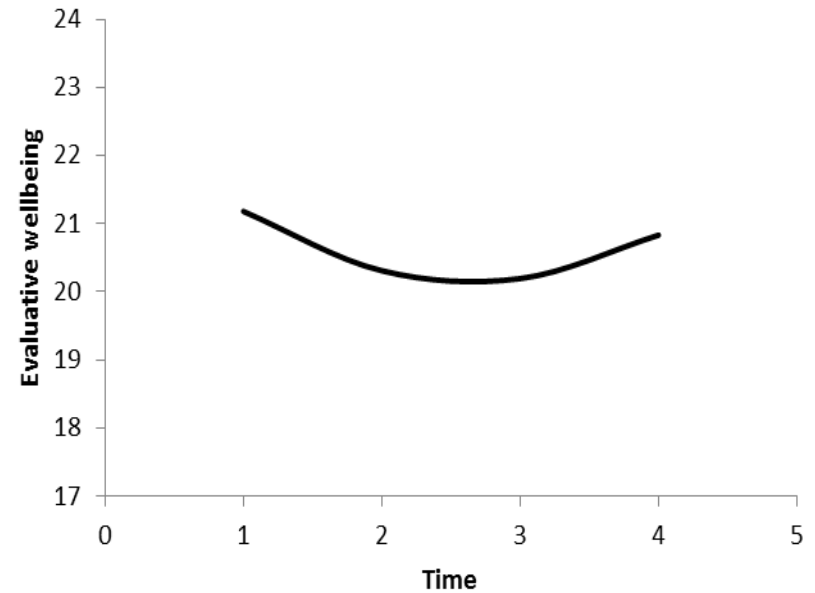
Figure 2. Scores on hedonic wellbeing (a) and evaluative wellbeing (b) over time by levels of social isolation.

Figure 3. Scores on hedonic wellbeing (a) and evaluative wellbeing (b) over time by levels of loneliness.

Figure 1. Changes in scores for hedonic wellbeing (a) and evaluative wellbeing (b) over time.^a



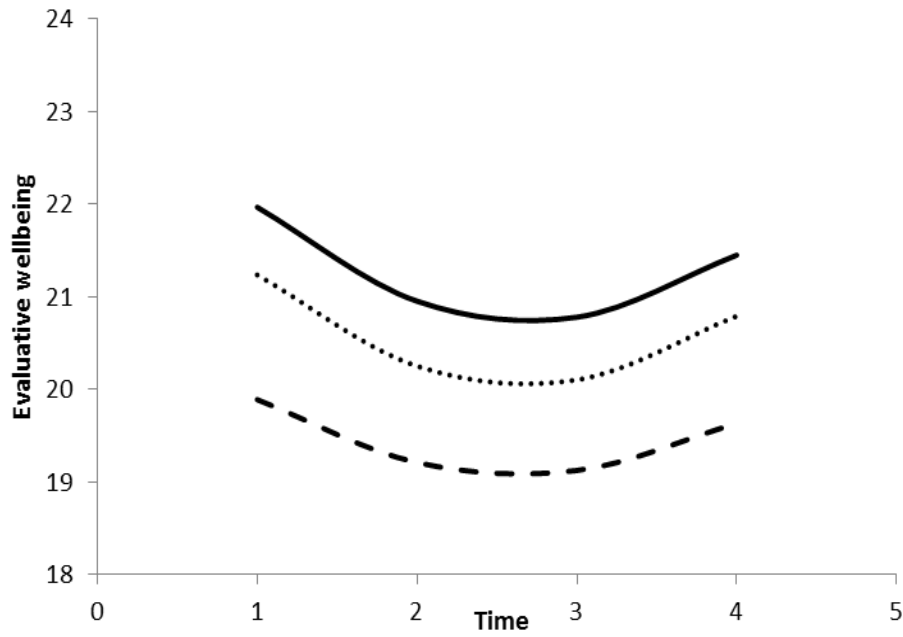
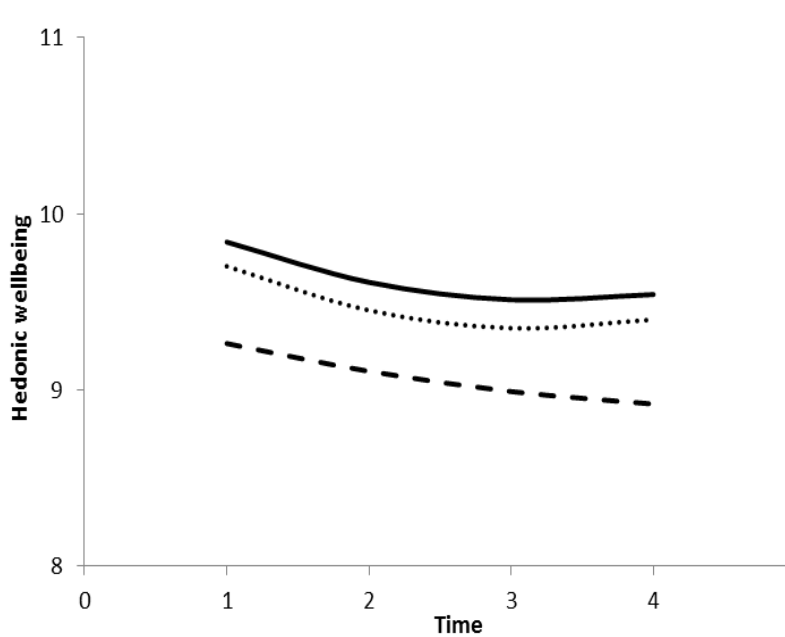
1(a)



1(b)

^aUnadjusted values.

Figure 2. Scores on hedonic wellbeing (a) and evaluative wellbeing (b) over time by levels of social isolation.^b

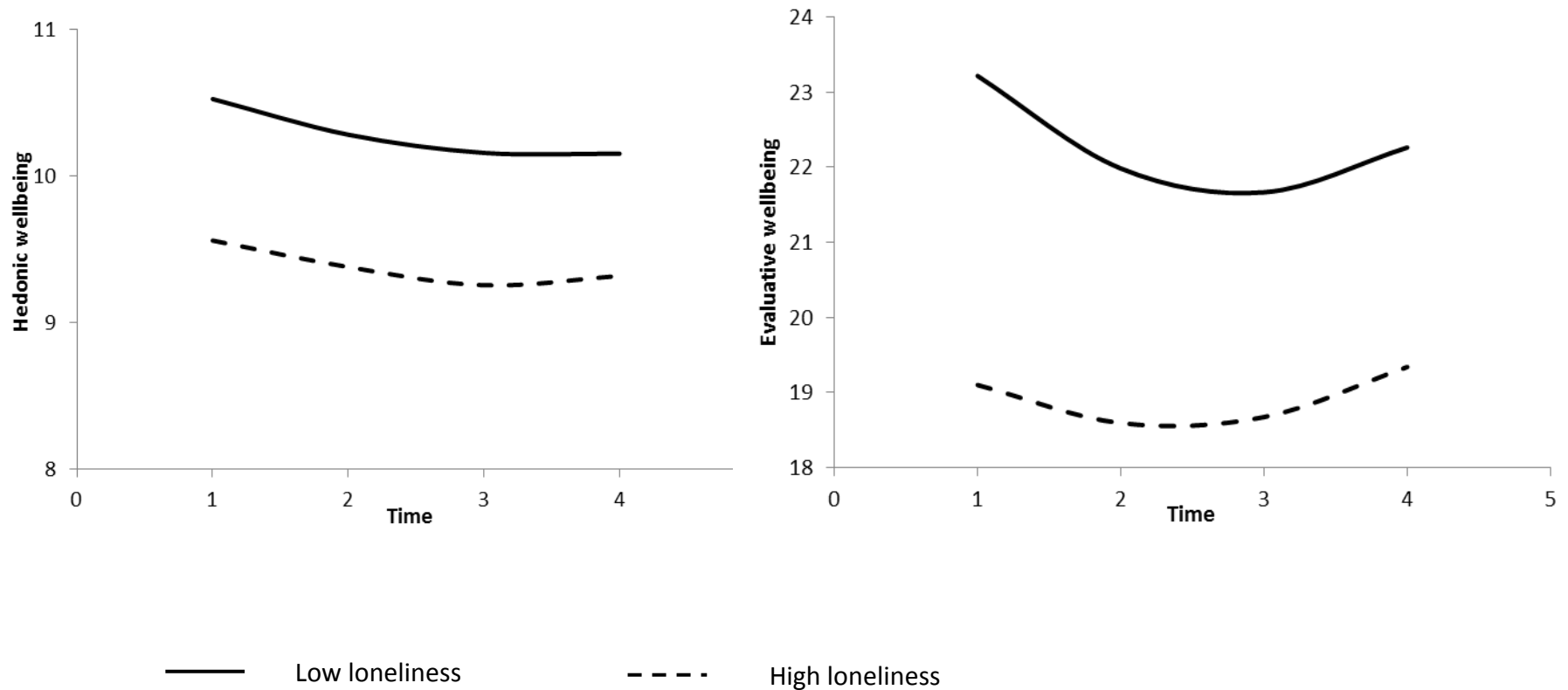


2(a)

2(b)

Low isolation
 Intermediate isolation
 High isolation

^bModels were adjusted for time, time², age, gender, limiting long-standing illness, quintile of wealth and loneliness category.

Figure 3. Scores on hedonic wellbeing (a) and evaluative wellbeing(b) over time by levels of loneliness^c

^cModels were adjusted for time, time², age, gender, limiting long-standing illness, quintile of wealth and isolation category.