

# Act-Belong-Commit Indicators Promote Mental Health and Wellbeing among Irish Older Adults

Ziggi Ivan Santini, PhD  
Line Nielsen, PhD  
Carsten Hinrichsen, MSc  
Charlotte Meilstrup, PhD  
Ai Koyanagi, PhD  
Josep Maria Haro, PhD  
Robert J. Donovan, PhD  
Vibeke Koushede, PhD

**Objective:** Act-Belong-Commit is the world's first population-wide, community-based mental health promotion campaign. We assessed the associations between baseline indicators of Act-Belong-Commit behavioral domains and wellbeing at 2-year follow-up in a population-based sample of Irish older adults. **Methods:** Data from 2 waves of the Irish Longitudinal Study on Ageing were analyzed. The sample consisted of 6098 adults. Outcomes were quality of life (QoL), life satisfaction (LS) and self-rated mental health (SRMH). Multivariable regression analyses were conducted. **Results:** The adjusted model showed that each increase in the number of social/recreational activities (Act) predicted better QoL and SRMH, but the positive association with LS did not reach statistical significance. Both social network integration (Belong) and frequency of participation in social/recreational activities (Commit) significantly promoted QoL, LS, and SRMH. These associations were apparent regardless of baseline common mental disorders. **Conclusion:** Act-Belong-Commit indicators are shown to promote wellbeing among Irish older adults, providing further support for the campaign's potential.

**Key words:** mental health; wellbeing; quality of life; aging; leisure; social support

*Am J Health Behav.*™ 2018;42(6):31-45

DOI: <https://doi.org/10.5993/AJHB.42.6.4>

As populations in Europe face increases in life expectancy, delayed onset of morbidities, and higher expectations for transitioning into older adulthood,<sup>1</sup> 'successful aging' has become a prime policy goal, with attention focused on physical health and functioning, psychological wellbeing, social functioning and participation.<sup>2</sup> Evidence is growing that strategies focused on successful aging can increase healthy life expectancies, postpone health expenditure, and have wider economic benefits.<sup>3-8</sup> Therefore, it is important to find

and focus on new and efficient ways of promoting mental health and wellbeing to facilitate and achieve successful aging in European populations.<sup>9-13</sup>

In 2015, a major European Union (EU) collaboration project identified priorities for public mental health research in the next 10 years, and reached consensus that the first priority was to address positive mental health when planning future actions and strategies.<sup>13</sup> Act-Belong-Commit is the world's first comprehensive, population-wide, community-based mental health campaign.<sup>14</sup> It is

*Ziggi Ivan Santini, The Danish National Institute of Public Health, University of Southern Denmark, Copenhagen, Denmark. Line Nielsen, The Danish National Institute of Public Health, University of Southern Denmark, Copenhagen, Denmark. Carsten Hinrichsen, The Danish National Institute of Public Health, University of Southern Denmark, Copenhagen, Denmark. Charlotte Meilstrup, The Danish National Institute of Public Health, University of Southern Denmark, Copenhagen, Denmark. Ai Koyanagi, Parc Sanitari Sant Joan de Déu, CIBERSAM, Barcelona, Spain. Josep Maria Haro, Parc Sanitari Sant Joan de Déu, CIBERSAM, Barcelona, Spain. Robert J. Donovan, School of Human Sciences, University of Western Australia, Perth, WA, Australia. Vibeke Koushede, The Danish National Institute of Public Health, University of Southern Denmark, Copenhagen, Denmark.*

Correspondence Dr Santini; [ziggi.santini@gmail.com](mailto:ziggi.santini@gmail.com)

designed as a practical framework to promote mental health and wellbeing in the overall population as well as in specific settings. The campaign is currently being implemented throughout Australia,<sup>14</sup> and so far, on a sub-national level in Denmark, where the campaign is known as *ABC for mental sundhed* (The ABC for mental health).<sup>15</sup> The Act-Belong-Commit campaign targets individuals to engage in mentally healthy activities while also encouraging community organizations to promote and increase participation in such activities. The Act-Belong-Commit framework promotes 3 behavioral domains thought to contribute to mental health and wellbeing: keeping physically, mentally, socially, and spiritually active (Act); developing a sense of belonging through social support networks and participation in group and community activities (Belong); and taking on challenges and committing to activities and hobbies that provide meaning and purpose (Commit).

The Act-Belong-Commit principles are derived from primary research with members of the general population in Australia regarding their beliefs about factors that promote positive mental health, and subsequent secondary research into the scientific literature with respect to such factors.<sup>16-18</sup> As part of adapting and implementing the campaign into the Danish context, Danish lay people's understandings of mental health and mental health promoting factors were similarly explored. Seven focus group interviews were conducted among 39 individuals (27 adults and 12 young people aged 12-70 years) from various regions across Denmark.<sup>19</sup> The interviews showed that Danish people's understanding of what constitutes good mental health and what people can do to keep mentally healthy were consistent with the underlying messages in the Act-Belong-Commit framework, and thus, translatable to a Danish context. Unprompted, the respondents came up with a variety of examples of how to safeguard and promote mental health – eg, staying active in various ways, spending time with family and friends, and engaging in meaningful activities and projects. Thus, the results lend support to the generic nature of the Act-Belong-Commit messages for mental health and wellbeing in the Danish context.

The Act-Belong-Commit campaign was developed in the context of the World Health Organi-

zation's (WHO) definition of health as “a state of complete physical, mental, and social wellbeing, not merely the absence of disease or infirmity,”<sup>20</sup> and WHO's definition of mental health as: “. . . a state of wellbeing in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community.”<sup>11</sup> That is, mental health is more than the absence of mental illness. It comprises wellbeing, which is understood as being fully functional (ie, realizing or developing one's potential), having the ability to handle the stressors of daily life, to form positive relationships with others, and to contribute positively to one's community or society.<sup>21-24</sup> The Act-Belong-Commit program provides a framework that, while emphasizing behaviors that promote positive mental health and wellbeing, at the same time can aid in the context of psychiatric morbidity, with Australian research showing that the campaign also engages those with a diagnosed mental disorder to improve their mental health.<sup>14,25</sup>

Mental health and wellbeing involve a range of constructs that are related but distinct from each other. Some of these constructs are quality of life, life satisfaction, and self-rated mental health. Quality of life has been defined as “the satisfaction of an individual's values, goals and needs through the actualization of their abilities or lifestyle.”<sup>26</sup> Life satisfaction is understood to represent “the degree to which one is presently content or pleased with his or her general life situation.”<sup>27</sup> Self-rated mental health represents a person's subjective assessment of his or her general mental health.<sup>28</sup>

In terms of behaviors and factors that promote mental health and wellbeing, a number of studies have shown associations between activity engagement and some measures of mental health and wellbeing in aging populations. For example, regular physical activity have been shown to be associated with future increases in health-related quality of life and reductions in depression/anxiety symptoms among mid-aged and older women.<sup>29,30</sup> Various forms of leisure activity have been shown to be prospectively associated with increases in quality of life, function, and reductions in mortality risk among older adults.<sup>31,32</sup> An extensive review of the literature on social/leisure activities and wellbeing also suggests positive associations to various well-

being outcomes.<sup>33</sup> However, most studies focus on either activity engagement or social network support and interaction, and prospective research is needed to assess how the Act-Belong-Commit domains are associated with positive mental health and wellbeing in a population-wide setting. Thus, the aim of our study was to investigate the extent to which Act-Belong-Commit indicators are associated with quality of life (QoL), life satisfaction (LS), and self-rated mental health (SRMH) in an older population.

To achieve this aim, we conducted a prospective study using data from the first 2 waves of the Irish Longitudinal Study on Ageing (TILDA). This is a nationally-representative community-based survey of the Irish population of older adults. As indicators of the Act-Belong-Commit domains, we used variables for participation in and frequency of social/recreational activities and social network integration.<sup>34</sup> We hypothesized that each of the Act-Belong-Commit indicators would be positively associated with QoL, LS, and SRMH in our sample.

## METHODS

### Participants and Data Collection

We analyzed data from 2 consecutive waves of the Irish Longitudinal Study on Ageing (TILDA). Full details of the survey and its sampling procedure have been described elsewhere.<sup>35-37</sup> TILDA is a nationally-representative population-based survey of older adults residing in Ireland. The survey was conducted between October 2009 and February 2011 for Wave 1 (W1), and between April 2012 and January 2013 for Wave 2 (W2). The target sample included all individuals residing in a household aged 50 and over. Nationally-representative samples were derived from clustered random sampling of all households in Ireland. The baseline survey (W1) excluded participants who were institutionalized and those with a doctor's diagnosis of dementia. Those who were unable to personally provide written informed consent to participate in the survey because of severe cognitive impairment were also excluded from W1.

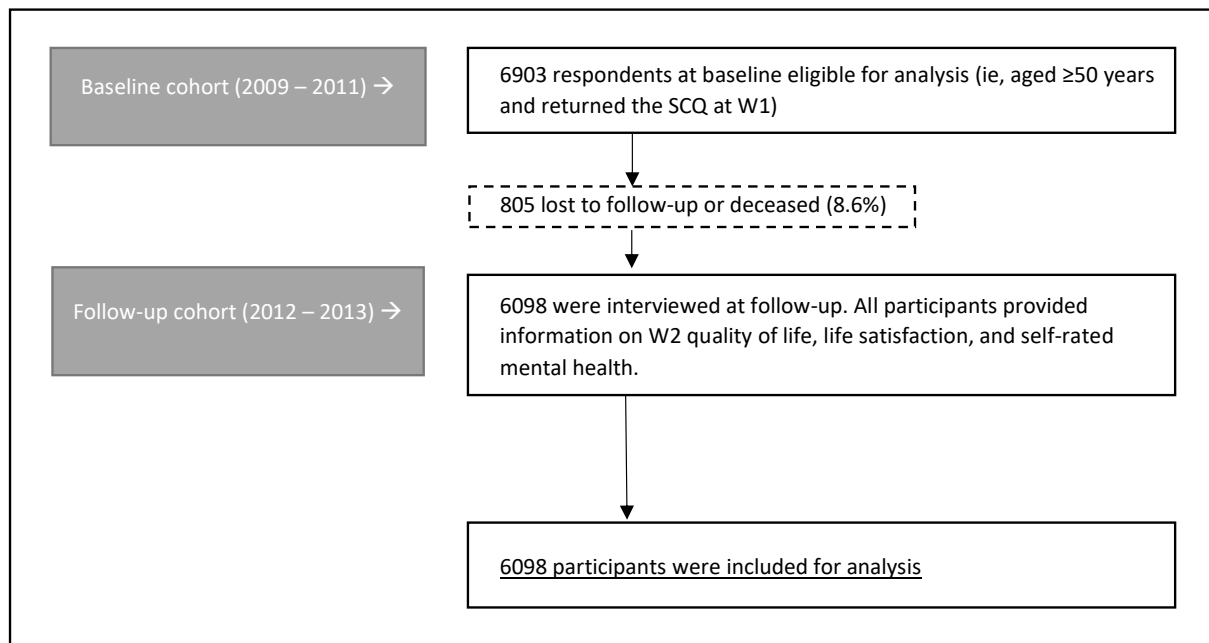
Data collection was conducted by trained interviewers using Computer Assisted Personal Interviewing (CAPI), and by a self-completion questionnaire (SCQ) which was returned after the

interview. All participants were subject to CAPI interviews and were also asked to complete the SCQ. The response rate of W1 was 62%, and of those who participated in the CAPI interview, 84% also returned the SCQ at W1.<sup>36,37</sup> W1 comprised 8504 people, including participants aged  $\geq 50$  years ( $N = 8175$ ) as well as their spouses or partners younger than 50 years ( $N = 329$ ). Of these 8504 people, follow-up data for 7207 participants were available at W2. Our analysis restricted the sample to participants aged 50 years and above at W1, participants who returned the SCQ at W1, and those who provided information on QoL, LS and SRMH at W2. We used these restrictions as the data on Act-Belong-Commit indicators and some other variables used in the analysis were obtained from the SCQ at W1. QoL, LS and SRMH were the only variables from W2 that were used in our analysis. In W2, information on QoL was obtained via the self-completion questionnaire, while LS and SRMH were obtained via the standard in-person CAPI interview. The sample size after restriction to these individuals was 6098 (Figure 1), comprising 12,196-person years of follow-up.

### Survey Instruments

**Wellbeing.** Wellbeing in this study is considered broadly as comprising ways that people evaluate their eudemonic wellbeing, evaluative wellbeing, and cognitive and emotional health.<sup>38</sup> Eudemonic wellbeing pertains to a perspective of psychological functioning that emphasizes various domains, such as autonomy, self-realization and meaningfulness, often assessed with measures of quality of life (QoL). Evaluative wellbeing focuses on a more global evaluation of life as a whole, often assessed with measures of life satisfaction (LS). Finally, self-rated mental health (SRMH) is a measure that can be used to assess individuals' cognitive and emotional health based on their own subjective evaluation. Large-scale research has demonstrated that both eudemonic and evaluative wellbeing are significant and relevant predictors of health and successful aging trajectories.<sup>39</sup> Also, SRMH has been reported to be a better predictor of overall health status than the more commonly used measure of self-rated health.<sup>28</sup> Thus, wellbeing represents an essential indicator of welfare, and its usefulness is increasingly acknowledged within the scientific

**Figure 1**  
**Flowchart of the Study Sample**



**Note.**

**Abbreviations:** SCQ – Self-completion questionnaire; W1 – Wave 1; W2 – Wave 2

community and in the context of global health policy.

The same measures were employed to assess well-being at W1 and W2. Eudemonic well-being was assessed using the CASP-19, a measure of QoL in older adulthood, a 19-item questionnaire assessing 4 domains represented by their respective first letters (CASP = Control, Autonomy, Self-actualization, Pleasure). The scale is based on Maslow's Hierarchy of Needs theory,<sup>40</sup> and elaborated by Doyal and Gough.<sup>41</sup> The scale has shown satisfactory psychometric properties for assessing QoL in older adulthood in other studies.<sup>42-45</sup> A validation study employing data from TILDA W1 also confirmed the usefulness of the CASP-19.<sup>46</sup> Although the results of that study did not find support for the 4-factor model, but rather recommended a revised 12-item scale for structural equation modeling purposes, the authors reported satisfactory fit for the uni-dimensional CASP-19 scale. Therefore, the authors argued that the CASP-19 scale is suitable for less complex analytic strategies, where researchers are interested in creating and using summary

scores of overall QoL. The exact 19 questions of the CASP-19 can easily be found in the literature. The 19 items were scored on scales from 0 (never), 1 (rarely), 2 (sometimes), to 3 (often) with 6 items reverse coded (recoded so items were based on the same scale). Scores were summed to create a scale that ranged from 0 to 57, with higher scores indicating better QoL.

Evaluative well-being was assessed using a global one-item question on LS. Participants were instructed to say how much they agree or disagree with the statement "I am satisfied with my life." Alternatives were presented on a show card ranging from 1 (strongly disagree) to 7 (strongly agree). Single-item LS measures have performed similarly and produced virtually identical results as multiple-item measures on life satisfaction.<sup>47</sup> The validity of single-item measures of life satisfaction, including satisfactory test-retest reliability, has been documented elsewhere.<sup>47,48</sup>

Cognitive and emotional health also was assessed with a global one-item measure for SRMH. Participants were asked: "What about your emotional or

mental health? Is it...”, and response options were presented on a show card ranging from 1 (poor), 2 (fair), 3 (good), 4 (very good) to 5 (excellent). A validation study on older adults in Canada found that single-item measures can be useful for monitoring general mental health status in population-based samples,<sup>49</sup> and according to a systematic review, the literature appears to indicate single-item measures of self-rated mental health as potentially robust population mental health measures.<sup>50</sup> Single-item measures of self-rated mental health have been validated and reported elsewhere.<sup>28,49-51</sup>

**Act-Belong-Commit indicators.** The Act-Belong-Commit indicators were defined in the identical way as in a previous publication using the same dataset.<sup>34</sup> Participants were told: “We would like to ask you some questions about participation in social activities. How often, if at all, do you do any of the following activities?” and shown the following list, with response categories going from “never,” “less than once a year,” “about once or twice a year,” “every few months,” “about once a month,” “twice a month or more,” “once a week or more” to “daily/almost daily:” Going to films, plays, concerts; Attending classes, lectures; Traveling for Pleasure; Working on garden, home, car; Reading books, magazines; Hobbies, creative activities; Playing Cards, bingo, games; Going to pub; Eating out of house; Participating in sport, exercise; Visiting or calling family, friends; Voluntary work. For an indicator of Act, participation in an activity was given the value 1, and non-participation was given the value 0, thus producing an overall score ranging from 0 to 12. There is no conventional way of assessing social and recreational participation, but it is a common method to construct participation variables from summary participation indices.<sup>52</sup> The same can be said regarding our constructed variable for Commit.

As an indicator of Belong, we used the Berkman-Syme Social Network Index (SNI), a measure of social network integration. The SNI is a validated self-report questionnaire<sup>53</sup> that assesses a person’s degree of social integration by: marital/partnership status (married/with partner (1) or not (0)); sociability (number and frequency of contact with children, close relatives, and close friends; many (1) or few(0)); church group membership (yes(1) or no(0)); and membership in other voluntary or-

ganizations (yes(1) or no(0)). The composite score ranged from 0 to 4 and was categorized according to the standard categorization described by Berkman, Syme<sup>53</sup> as 0-1 (most isolated), 2 (moderately isolated), 3 (moderately integrated), and 4 (most integrated). The SNI demonstrates convergent validity with other measures of social support,<sup>54</sup> and scores on the SNI are predictive of health and mortality outcomes.<sup>55</sup> The coding used to construct the scale in the Tilda survey is described in Tilda publications.<sup>56</sup>

Commit refers to the extent to which individuals commit to activities or challenges, set and achieve small and large goals, or become involved with causes or organizations. Whereas the concept behind Commit implies a broad sense of involvement and commitment to activities, one indicator of Commit is the frequency with which individuals engage in activities.<sup>14,15</sup> Thus, to construct a variable for Commit, we assessed the frequency of participation in the 12 activities mentioned in the Act section. For each of the activities, participants were asked to rate how often they engaged in them, from 0 (never) to 7 (daily or almost daily). The scores were added to produce an overall score ranging from 0-84.

**Covariates.** Sociodemographic characteristics included sex (women, men), age (50–59, 60–69, 70–79, and ≥80 years), education, and employment status. Education was classified as primary (some primary/not complete; primary or equivalent), secondary (intermediate/junior/group certificate or equivalent; leaving certificate or equivalent), and tertiary (diploma/certificate; primary degree; post-graduate/higher degree). More information about the classification of education in the TILDA survey is documented elsewhere.<sup>36,57</sup> Current employment status was categorized as employed (employed and self-employed, including farming), retired, and unemployed (unemployed, permanently sick or disabled, looking after home or family, or in education or training).

The number of chronic medical conditions was assessed by the question “has a doctor ever told you that you have any of the conditions on this card?” Responses included 17 conditions: high blood pressure or hypertension; angina; heart attack (including myocardial or coronary thrombosis); congestive heart failure; diabetes or high blood sugar; stroke

**Table 1**  
**Baseline Characteristics of the Study Sample**

Characteristic	Category	N(%)
<b>Unweighted N</b>		6098
<b>Sex</b>	Women	3321 (51.7)
<b>Age (years)</b>		
	50-59	2485 (41.5)
	60-69	2010 (31.4)
	70-79	1218 (19.4)
	80+	385 (7.7)
<b>Education</b>		
	Primary	1605 (36.0)
	Secondary	2519 (44.5)
	Tertiary	1966 (19.6)
<b>Employment status</b>		
	Employed	2282 (37.3)
	Retired	2253 (34.9)
	Unemployed	1484 (27.9)
<b>Chronic medical conditions</b>		
	None	1426 (23.7)
	One	1724 (27.9)
	Two or more	2948 (48.4)
<b>ADL disability</b>	Present	487 (8.7)
<b>Common mental disorder<sup>a</sup></b>	Present	1598 (28.4)
<b>QoL continuous score (mean ± SD)<sup>b</sup></b>		44.04 (7.93)
<b>Life satisfaction (mean ± SD)<sup>c</sup></b>		6.08 (1.18)
<b>Self-rated mental health (mean ± SD)<sup>d</sup></b>		3.73 (0.98)
<b>Act (mean ± SD)<sup>e</sup></b>		9.12 (2.40)
<b>Belong<sup>f</sup></b>		
	Most isolated	380 (7.1)
	Moderately isolated	1582 (27.9)
	Moderately integrated	2525 (41.2)
	Most integrated	1611 (23.8)
<b>Commit (mean ± SD)<sup>g</sup></b>		41.70 (12.25)

**Note.**

Data are unweighted N (%) unless otherwise specified. Sampling weights were used for the calculation of proportions and means (SD). Abbreviations: ADL – Activities of Daily Living.

a: Common mental disorder included CES-D depression and HADS-A anxiety

b: Quality of life (based on the CASP-19, range 0-57)

c: Single-item measure (range 1-7)

d: Single-item measure (range 1-5)

e: Number of activities engaged in. Possibilities include: Going to films, plays, concerts; Attending classes, lectures; Travelling for Pleasure; Working on garden, home, car; Reading books, magazines; Hobbies, creative activities; Playing Cards, bingo, games; Going to pub; Eating out of house; Participating in sport, exercise; Visiting or calling family, friends; Voluntary work. The scale ranged from 0-12.

f: Based on the Social Network Index (SNI)

g Frequency of engagement in activities listed in Act. The scale ranged from 0-84.

**Table 2**  
**The Association between Baseline Act-Belong-Commit Indicators and Quality of Life<sup>a</sup> among Older Adults Estimated by Multivariable Linear Regression**

	Model I			Model II		
	Coefficient	95% CI	p-value	Coefficient	95% CI	p-value
<b>Act<sup>b</sup></b>	<b>0.130</b>	0.011, 0.250	.032	<b>0.143</b>	0.020, 0.266	.022
<b>Belong<sup>c</sup></b>						
<b>Most isolated</b>	1			1		
<b>Moderately isolated</b>	0.602	-0.337, 1.541	.209	0.537	-0.443, 1.517	.282
<b>Moderately integrated</b>	<b>1.439</b>	0.521, 2.357	.002	<b>1.343</b>	0.390, 2.295	.006
<b>Most integrated</b>	<b>1.527</b>	0.603, 2.452	.001	<b>1.526</b>	0.559, 2.492	.002
<b>Commit<sup>d</sup></b>	<b>0.040</b>	0.019, 0.061	< .001	<b>0.041</b>	0.019, 0.062	< .001

**Note**

Model I adjusted for gender, age, education, employment status, chronic medical conditions, ADL disability, as well as quality of life collected at W1. Model II adjusted for the aforementioned as well as the presence of common mental disorders at W1 (CES-D depression / HADS-A anxiety). CI: confidence interval. Significant results in bold.

a: W2 quality of life (based on the CASP-19, range 0-57)

b: Number of activities engaged in. Possibilities include: Going to films, plays, concerts; Attending classes, lectures; Travelling for Pleasure; Working on garden, home, car; Reading books, magazines; Hobbies, creative activities; Playing Cards, bingo, games; Going to pub; Eating out of house; Participating in sport, exercise; Visiting or calling family, friends; Voluntary work. The scale ranged from 0-12.

c: Based on the Social Network Index (SNI)

d: Frequency of engagement in activities listed in Act. The scale ranged from 0-84.

(cerebral vascular disease); mini-stroke or transient ischemic attack; high cholesterol; heart murmur; abnormal heart rhythm; any other heart trouble; chronic lung disease such as chronic bronchitis or emphysema; asthma; arthritis (including osteoarthritis, or rheumatism); osteoporosis; cancer or a malignant tumor (including leukemia or lymphoma but excluding minor skin cancers); cirrhosis or serious liver damage. The total number of chronic medical conditions was calculated and categorized as 0 (none), 1, or  $\geq 2$ .

Difficulties with 6 types of activities of daily living (ADL) (dressing, walking, bathing, eating, getting in or out of bed, and using the toilet)<sup>58</sup> were assessed by asking participants to indicate whether they had difficulty performing these activities. ADL disability was defined as having difficulty with at least one of these ADLs.

The existence of common mental disorders at baseline was operationalized as including the presence of either depression, anxiety, or both. The scale used for depression was the 20-item Center for Epidemiologic Studies Depression (CES-D),<sup>59-61</sup> where case depression was defined as a score

of  $\geq 16$ .<sup>62</sup> The scale used for anxiety was the anxiety subscale of the Hospital Anxiety and Depression Scale (HADS-A),<sup>63,64</sup> where anxiety was defined as a score of  $\geq 8$ .<sup>65,66</sup>

### Data Analysis

We used Stata version 13.1 (Stata Corp LP, College Station, Texas) for data analysis. A descriptive analysis was conducted to demonstrate the baseline sample characteristics. These analyses included unweighted frequencies, and weighted proportions, means, and standard deviations. Multivariable linear regression analysis was conducted to assess the associations between Act-Belong-Commit indicators and QoL. According to recommendations for analyzing ordered wellbeing outcomes,<sup>67</sup> multivariable ordered probit analysis was used to assess the association between Act-Belong-Commit indicators and LS and SRMH. Act-Belong-Commit indicators (exposure variables) were based on data collected at W1. The 3 outcomes were QoL, LS, and SRMH collected at W2. All model I multivariable models were adjusted for sex, age, education, employment status, number of chronic medical

**Table 3**  
**The Association between Baseline Act-Belong-Commit Indicators and Life Satisfaction<sup>a</sup>**  
**among Older Adults Estimated by Multivariable Probit Regression**

	Model I			Model II		
	Coefficient	95% CI	p-value	Coefficient	95% CI	p-value
Act <sup>b</sup>	0.016	-0.0004, 0.033	.055	0.014	-0.003, 0.031	.101
Belong <sup>c</sup>						
Most isolated	1			1		
Moderately isolated	0.078	-0.053, 0.210	.243	0.063	-0.069, 0.196	.349
Moderately integrated	<b>0.248</b>	0.120, 0.376	< .001	<b>0.238</b>	0.111, 0.365	< .001
Most integrated	<b>0.354</b>	0.222, 0.486	< .001	<b>0.349</b>	0.216, 0.482	< .001
Commit <sup>d</sup>	<b>0.006</b>	0.003, 0.010	< .001	<b>0.006</b>	0.003, 0.009	< .001

**Note.**

Model I adjusted for gender, age, education, employment status, chronic medical conditions, ADL disability, as well as life satisfaction collected at W1. Model II adjusted for the aforementioned as well as the presence of common mental disorders at W1 (CES-D depression / HADS-A anxiety). CI: confidence interval. Significant results in bold.

a: W2 life satisfaction. Single-item measure (range 1-7)

b: Number of activities engaged in. Possibilities include: Going to films, plays, concerts; Attending classes, lectures; Travelling for Pleasure; Working on garden, home, car; Reading books, magazines; Hobbies, creative activities; Playing Cards, bingo, games; Going to pub; Eating out of house; Participating in sport, exercise; Visiting or calling family, friends; Voluntary work. The scale ranged from 0-12.

c: Based on the Social Network Index (SNI)

d: Frequency of engagement in activities listed in Act. The scale ranged from 0-84.

conditions, and ADL disability based on information obtained at W1, as well as the corresponding outcome at W1 (that is, W1 QoL, W1 LS, or W1 SRMH). Chronic medical conditions and disability were considered as potential confounders as they have been associated with wellbeing,<sup>39,68,69</sup> and because they are also known to be related to social networks<sup>70-73</sup> and engagement in social/recreational activities.<sup>74,75</sup> All model II multivariable models were adjusted for the same variables as in model I and additionally the presence of common mental disorders at baseline. This was done as a sensitivity analysis to investigate the role of mental disorder in the association between predictors and outcomes. We also checked for interactions by including an interaction term between each predictor variable and common mental disorders.

With the exception of the Act and Commit indicators, all variables were included in the models as categorical variables. Sampling weights were generated with respect to age, sex, and educational attainment to the Quarterly National Household Survey 2010. In all analyses, the sample weighting and the complex study design including clustering

within households were taken into account to obtain nationally-representative estimates using the Stata svy command. Results are expressed as coefficients and 95% confidence intervals (95% CIs). A p-value < .05 was considered to be statistically significant.

To assess the influence of multicollinearity, we calculated the variance inflation factor (VIF) value for each independent variable. All VIFs were <2, which is much lower than the commonly used cut-off of 10,<sup>76</sup> indicating that multicollinearity was unlikely to be a problem in our analyses.

## RESULTS

The average age (SD) of the analytical sample (N = 6098) was 63.3 (9.2) years, and 51.7% were women. For all respondents who had a follow-up interview at W2, the median lag between the 2 waves was 24 months (range 16-40 months). The baseline sample characteristics are presented in Table 1. Table 2 shows the association between Act-Belong-Commit indicators and QoL estimated by multivariable linear regression. Table 3 shows the



**Table 4**  
**The Association between Baseline Act-Belong-Commit Indicators and Self-rated Mental Health<sup>a</sup> among Older Adults Estimated by Multivariable Probit Regression**

	Model I			Model II		
	Coefficient	95% CI	p-value	Coefficient	95% CI	p-value
Act <sup>b</sup>	<b>0.031</b>	0.015, 0.048	< .001	<b>0.026</b>	0.010, 0.043	.002
Belong <sup>c</sup>						
Most isolated	1			1		
Moderately isolated	<b>0.138</b>	0.006, 0.270	.041	0.128	-0.010, 0.266	.069
Moderately integrated	<b>0.196</b>	0.069, 0.324	.003	<b>0.162</b>	0.028, 0.296	.018
Most integrated	<b>0.260</b>	0.125, 0.395	< .001	<b>0.231</b>	0.090, 0.373	.001
Commit <sup>d</sup>	<b>0.008</b>	0.005, 0.011	< .001	<b>0.007</b>	0.004, 0.010	< .001

**Note.**

Model I adjusted for gender, age, education, employment status, chronic medical conditions, ADL disability, as well as self-rated mental health collected at W1. Model II adjusted for the aforementioned as well as the presence of common mental disorders at W1 (CES-D depression / HADS-A anxiety). CI: confidence interval. Significant results in bold.

a: W2 self-rated mental health. Single-item measure (range 1-5)

b: Number of activities engaged in. Possibilities include: Going to films, plays, concerts; Attending classes, lectures; Travelling for Pleasure; Working on garden, home, car; Reading books, magazines; Hobbies, creative activities; Playing Cards, bingo, games; Going to pub; Eating out of house; Participating in sport, exercise; Visiting or calling family, friends; Voluntary work. The scale ranged from 0-12.

c: Based on the Social Network Index (SNI)

d: Frequency of engagement in activities listed in Act. The scale ranged from 0-84.

association between Act-Belong-Commit indicators and LS estimated by multivariable probit regression analysis, and a similar Table 4 shows the association between Act-Belong-Commit indicators and self-rated mental health. The following reported results pertain to those obtained in the model I multivariate regressions. In terms of the Act indicator, each increase in number of activities at baseline predicted better QoL [coefficient (95%CI): 0.130 (0.011, 0.250), Table 2], and SRMH [0.031 (0.015, 0.048), Table 4], while the relationship between the Act indicator at baseline and LS at follow-up was non-significant (Table 3). In terms of the Belong indicator at baseline, as compared to the most isolated category, there were significant positive associations with QoL at follow-up, specifically the moderately integrated [1.439 (0.521, 2.357), Table 2] and most integrated [1.527 (0.603, 2.452), Table 2]. Similarly, there were positive associations with LS among the moderately integrated [0.248 (0.120, 0.376), Table 3] and most integrated [0.354 (0.222, 0.486), Table 3]. In predicting SRMH at follow-up, relative to the most isolated, positive associations were found

for the moderately isolated category [0.138 (0.006, 0.270), Table 4], the moderately integrated category [0.196 (0.069, 0.324), Table 4] and the most integrated category [0.260 (0.125, 0.395), Table 4]. In terms of the Commit indicator, each increase in frequency of activity engagement at baseline predicted better QoL [0.040 (0.019, 0.061), Table 2], LS [0.006 (0.003, 0.010), Table 3], and SRMH [0.008 (0.005, 0.011), Table 4].

As mentioned previously, we performed an additional analysis where we included baseline common mental disorders as a covariate (shown in Table 2, 3, and 4). The results were similar, both in terms of effect size and statistical significance, except in one case where the increase in SRMH was no longer statistically significant for the moderately isolated after inclusion of common mental disorders (moderately isolated and SRMH, Table 4). We found no statistically significant interactions between the predictor variables and common mental disorders.

Finally, to check the robustness of our main results, we conducted an analysis to investigate whether Act-Belong-Commit indicators would be associated with change between the outcomes from

W1 to W2. We carried out a regression analysis in which the outcome at W1 was the independent variable and the outcome at W2 was the dependent variable and saved the standardized residuals as a measure of change between the waves. The results yielded similarly significant results as our main results, only with the exception of Act losing significance to QoL after adjusting for common mental disorder (data not shown).

## DISCUSSION

In this study, we investigated the association between baseline Act-Belong-Commit indicators and wellbeing among adults aged 50 and above in Ireland. Overall, our findings demonstrate that keeping more active and committed to these activities, as well as being well socially integrated, predict better QoL, LS (with the exception of Act to life satisfaction), and SRMH.

### Contextualization of Findings

Our findings documenting the benefits of the Act-Belong-Commit behavioral domains for wellbeing outcomes are in line with previous research suggesting that much of the variation in positive mental health and wellbeing is contingent on behaviors and lifestyle factors. For example, research has shown that about 50% of the variation in happiness can be accounted for by genetics, and a further 10% by life circumstances, such as socio-demographics.<sup>77</sup> The remaining 40% is modifiable and relates to intentional activity, meaning that a substantial amount is within human control. Within the Act-Belong-Commit framework, such modifiable factors pertain to the activities people engage in, the types of groups people join to engage in activities, and the extent to which people commit to activities that provide meaning and purpose in their lives.

In terms of engaging in activities, our results are in line with previous reviews<sup>33</sup> and original research studies showing that social engagement,<sup>78</sup> engaging in creative activities,<sup>79</sup> or various sport or leisure activities<sup>29-32,80-84</sup> are positively associated with a number of outcomes related to positive mental health and wellbeing. However, the relationship between the Act predictor and the outcome on LS did not reach statistical significance. A reason for this may be that particularly evaluative wellbeing measures

have been found to be sensitive to wider societal and macroeconomic factors, such as Gross Domestic Product (GDP), life expectancy, and freedom, although evaluative wellbeing has also been shown to be sensitive to social support.<sup>85</sup> It may be that eudemonic wellbeing and SRMH are outcomes that are more influenced by variations in the Act domain.

In terms of being socially integrated, the significant positive associations to all outcomes confirm previously reported studies that better social network integration is associated with higher levels of wellbeing. Similar positive associations between good social support networks and wellbeing have been documented in meta-analytical research,<sup>86,87</sup> as well as a number of nationally-representative studies in diverse, cultural settings globally, such as the USA,<sup>88,89</sup> Germany,<sup>78</sup> and China.<sup>90</sup>

In terms of frequency of engaging in activities, our results yielded significant associations to all outcomes. There is some evidence suggesting that greater frequencies are associated with higher levels of wellbeing when the activities require more personal effort (eg, performing sports, painting, playing an instrument), while the association between wellbeing and more passive types of activities (eg, going to a museum, opera, cinema) is not contingent on increasing frequencies.<sup>80</sup> According to the Act-Belong-Commit framework, committing to an activity and participating in it with greater frequencies is warranted and worth considering especially when a) the individual derives meaning, purpose, or self-realization from it, or b) the individuals establish useful contacts and strengthen relationships with others through the activity.<sup>77,87,91-93</sup>

The association between Act-Belong-Commit indicators and wellbeing may be bi-directional, for example, activity engagement may promote wellbeing, and conversely, people who report greater wellbeing are also more likely to engage in activities. We sought to investigate this by exchanging predictors and outcomes in our models, and found that QoL significantly predicted Act, while LS and SRMH did not obtain statistical significance (data not shown). Other studies have shown that the association between wellbeing and certain activities, such as volunteering, appears to be bi-directional in a similar manner.<sup>94,95</sup>

Finally, our analysis indicated that the ob-

tained results were not mediated, nor moderated by baseline common mental disorders. This suggests an independent association between baseline Act-Belong-Commit indicators and wellbeing at follow-up, which is not contingent on psychiatric morbidity. In other words, Act-Belong-Commit behaviors appear to promote wellbeing prospectively regardless of whether an individual is experiencing mental health problems, ie, benefiting everyone across the entire continuum from mental ill-health to positive mental health.

### Implications for Research, Policy and Practice

To date, the primary focus on mental health has been on individual treatment for mental health problems and reduction of risk factors (eg, stress prevention). Although mental health and wellbeing is closely connected to healthy life years, productivity, and what one might simply refer to as “a good life” (and therefore ought to be considered a major goal in and of itself), mental health promoting factors are generally under-researched and under-prioritized.<sup>13,96</sup> An increased focus on what makes people thrive and maintain good mental health is long overdue in research as well as in policy and practice.

The results of this study, along with other published works,<sup>34,97</sup> show that engaging in Act, Belong and Commit behaviors is associated with both enhanced mental health and wellbeing, as well as reduced risk for developing mental, neurological, and substance use disorders. Future research could look at factors influencing the ability to do so (eg, age, physical health, self-efficacy, access and proximity to activities, financial capacity, family composition, working hours etc.),<sup>80,98-100</sup> so that interventions can be tailored to meet the needs of various sub-groups. Also, intervention studies or controlled trials of the Act-Belong-Commit campaign messages, both at the community level, as well as in targeted settings such as clinics, schools and worksites are relevant. So far, the campaign has been effective in promoting knowledge and engagement in mentally healthy activities in Australia,<sup>25,101</sup> and the adaptation and implementation in Denmark looks promising in terms of creating awareness about mental health and facilitating collaboration between community organizations that offer mentally healthy activities. To ensure that policies, services and programs are

effective and to monitor population mental health and wellbeing, a related research priority should be to develop robust and standardized measures for mental health promoting behaviors.

Whereas there are commendable documents setting out ‘frameworks’ for mental health promotion, such as the WHO’s Promoting Mental Health: Concepts, Emerging Evidence, Practice),<sup>11</sup> these appear to have rather limited practical value to health promotion professionals ‘on-the-ground’. The Act-Belong-Commit campaign was designed to fill this vacuum by providing a practical mental health promotion framework to health professionals. Furthermore, the framework was designed not just for health professionals but for any organization to effectively offer mentally healthy activities. The results of this study, along with some of our other papers<sup>34,97</sup> and Australian evaluations,<sup>25</sup> confirm that this simple framework, focusing on increasing or maintaining people’s Act, Belong and Commit behaviors, provides evidence-informed, practical guidelines for policy and practice. Perhaps one of the most important lessons for policymakers is that the behaviors that promote mental health and wellbeing are everyday activities that most people can do and may already be participating in, and that these behaviors are delivered by existing organizations across a variety of areas. That is, the demand of governments is not to expend funds providing something new, but to validate people’s intuitive beliefs that these behaviors are good for their mental health, to facilitate engaging in these behaviors, and to support and encourage existing organizations and infrastructure that provide mentally healthy activities.

Importantly, Act-Belong-Commit’s overarching framework allows for implementation at the population level, in specific settings, for targeted groups, and in the clinic. Hence the campaign is implemented through partnerships with local governments, schools, workplaces, health services, national and state-wide government departments, community organizations, and local sporting and recreational clubs. That is, the campaign actually ‘walks the talk’ that ‘mental health is everybody’s business’. Given that many of the key determinants or drivers of mental health are outside the health arena,<sup>102-104</sup> a further policy and practice implication is that to optimize any mental health promo-

tion initiative, whole-of-government approaches are essential, and particularly across sectors such as education, public health, disability, sport, recreation, and the arts, along with the need to ensure appropriate activities and interventions across the lifespan.

### **Strengths and Limitations**

The strengths of the study include the large sample size, the use of nationally-representative data, and a set of widely utilized measures for wellbeing, including a validated scale for QoL. Limitations are as follows. First, the Wave 1 survey response rate was modest (62%). However, this is comparable to previous national surveys,<sup>105</sup> and other epidemiological studies have found that poor response rates have a minimal effect on risk estimates and in probability estimation for mental health status.<sup>106,107</sup> Other limitations may include the non-participation of institutionalized older adults and people with dementia. Second, we used proxies for the Act-Belong-Commit domains. The underlying concepts are broader in scope, and our predictor variables may not fully have captured the essence of the Act-Belong-Commit framework. Furthermore, no study has yet validated the psychometric properties of the Act-Belong-Commit domains. Such a study is strongly needed to assess if and how they can be used as a psychological instrument for measuring and monitoring mental health promoting behaviors. Third, baseline data for Act-Belong-Commit indicators were used for the analysis. Consequently, it is possible that some conditions or characteristics of the participants changed between the 2 waves. Fourth, there were certain variables that were not available to us in the dataset. For example, it is possible that personality type could account for variations in both predictors<sup>108,109</sup> and outcomes.<sup>38</sup> Last, those who were not followed at W2 were more likely to be older, unemployed, and to have a disability and lower education at baseline. Thus, some degree of bias might have been introduced due to loss at follow-up.

### **Conclusion**

Mental health and wellbeing is more than the absence of mental health problems or psychological distress. Having a sense of meaning and purpose in life, something to get out of bed for in the morn-

ing, good social ties, and a feeling of contributing with and to something or someone, are critical aspects of mental health and wellbeing. Evidence suggests that these aspects are generic and important to all people regardless of age, sex, culture, social background, physical or psychological health status. Our study has demonstrated that Act-Belong-Commit indicators significantly predict wellbeing in Irish community-dwelling older adults. Being mentally, physically, spiritually, or socially active (Act) was positively associated with QoL and SRMH, while the association with LS did not reach statistical significance. Being well integrated into social networks (Belong) was positively associated with QoL, LS, and SRMH. Similarly, increasing frequency of engaging in activities (Commit) was positively associated with all wellbeing outcomes. Additionally, our analysis indicated that the favorable associations to wellbeing are apparent regardless of the presence of baseline common mental disorders. Our study provides substantive further evidence for the Act-Belong-Commit campaign's public health potential in terms of promoting positive mental health and wellbeing in the general population.

### **Human Subjects Statement**

Ethical approval was obtained from the ethics committee of Trinity College Dublin for both waves of the study. Written informed consent was obtained from all participants.

### **Conflict of Interest Statement**

No conflicts of interest declared.

### **Acknowledgements**

The TILDA data have been co-funded by the Government of Ireland through the Office of the Minister for Health and Children, by Atlantic Philanthropies, and by Irish Life; have been collected under the Statistics Act, 1993, of the Central Statistics Office. The project has been designed and implemented by the TILDA Study Team © Department of Health and Children. Copyright and all other intellectual property rights relating to the data are vested in TILDA.

Ai Koyanagi's work was supported by the Miguel Servet contract financed by the CP13 / 00150

project, integrated into the National R + D + I and funded by the ISCIII - General Branch Evaluation and Promotion of Health Research - and the European Regional Development Fund (ERDF).

## References

1. Rechel B, Grundy E, Robine JM, et al. Ageing in the European Union. *Lancet*. 2013;381(9874):1312-1322.
2. Bowling A, Dieppe P. What is successful ageing and who should define it? *Br Med J*. 2005;331(7531):1548-1551.
3. Christensen K, Doblhammer G, Rau R, Vaupel JW. Ageing populations: the challenges ahead. *Lancet*. 2009;374(9696):1196-1208.
4. Gandjour A. Aging diseases--do they prevent preventive health care from saving costs? *Health Econ*. 2009;18(3):355-362.
5. Gandjour A, Lauterbach KW. Does prevention save costs? Considering deferral of the expensive last year of life. *J Health Econ*. 2005;24(4):715-724.
6. Doyle Y, McKee M, Rechel B, Grundy E. Meeting the challenge of population ageing. *Br Med J*. 2009;339:b3926.
7. Doyle YG, Mc Kee M, Sherriff M. A model of successful ageing in British populations. *Eur J Public Health*. 2012;22(1):71-76.
8. Diener E, Chan MY. Happy people live longer: subjective well-being contributes to health and longevity. *Appl Psychol Health Well Being*. 2011;3(1):1-43.
9. Anwar McHenry J, Donovan RJ. Developing the Perth Charter for the promotion of mental health and wellbeing. *Adv Ment Health*. 2013;12(1):8-10.
10. European Commission. *Improving Mental Health in Population: Policy Briefs*. Luxembourg City, Luxembourg: European Commission; 2008. Available at: [http://ec.europa.eu/health/ph\\_determinants/life\\_style/mental/docs/policy\\_briefs\\_en.pdf](http://ec.europa.eu/health/ph_determinants/life_style/mental/docs/policy_briefs_en.pdf). Accessed July 7, 2018.
11. World Health Organization (WHO). *Promoting Mental Health: Concepts, Emerging Evidence, Practice*. Geneva, Switzerland: WHO; 2004.
12. World Health Organization (WHO). *Mental Health Action Plan for Europe: Facing the Challenges, Building Solutions*. Copenhagen, Denmark: WHO; 2005.
13. Forsman AK, Wahlbeck K, Aaro LE, et al. Research priorities for public mental health in Europe: recommendations of the ROAMER project. *Eur J Publ Health*. 2015;25(2):249-254.
14. Donovan R, Anwar McHenry J. Act-Belong-Commit: lifestyle medicine for keeping mentally healthy. *Am J Lifestyle Med*. 2014;8:33-42.
15. Koushede V, Nielsen L, Meilstrup C, Donovan RJ. From rhetoric to action: adapting the Act-Belong-Commit Mental Health Promotion Programme to a Danish context. *Int J Ment Health Promot*. 2015;17(1):22-33.
16. Donovan RJ, Henley N, Jalleh G, et al. People's beliefs about factors contributing to mental health: implications for mental health promotion. *Health Promot J Austr*. 2007;18(1):50-56.
17. Pettigrew S, Donovan R. Older audiences' responses to mental health promotion messages. *Int J Ment Health Promot*. 2009;11:23-31.
18. Donovan R, James R, Jalleh G, Sidebottom C. Implementing mental health promotion: the Act-Belong-Commit Mentally Healthy WA Campaign in Western Australia. *Int J Ment Health Promot*. 2006;8(1):33-42.
19. Nielsen L, Sørensen BB, Donovan RJ, et al. 'Mental health is what makes life worth living': an exploration of lay people's understandings of mental health in Denmark. *Int J Ment Health Promot*. 2017;19(1):26-37.
20. World Health Organization (WHO). Constitution of WHO. 1946. Available at: <http://www.who.int/about/mission/en/>. Accessed June 7, 2018.
21. Chida Y, Steptoe A. Positive psychological well-being and mortality: a quantitative review of prospective observational studies. *Psychosom Med*. 2008;70(7):741-756.
22. Huppert F. Positive mental health in individuals and populations. In Huppert F, Baylis N, eds. *The Science of Well-being*. Oxford, UK: Oxford Scholarship Online; 2005.
23. Keyes CLM. The mental health continuum: from languishing to flourishing in life. *J Health Soc Behav*. 2002;43(2):207-222.
24. Kirkwood TBJ, May C, McKeith I, Teh M. *Foresight Mental Capital and Wellbeing Project. Mental Capital Through Life: Future Challenges*. London, UK: The Government Office for Science; 2008.
25. Donovan R, Jalleh G, Robinson K, Lin C. Impact of a population-wide mental health promotion campaign on people with a diagnosed mental illness or recent mental health problem. *Aust NZ J Public Health*. 2016;40(3):274-275.
26. Emerson EB. Evaluating the impact of deinstitutionalization on the lives of mentally retarded people. *Am J Ment Defic*. 1985;90(3):277-288.
27. Lemon BW, Bengtson VL, Peterson JA. An exploration of the activity theory of aging: activity types and life satisfaction among in-movers to a retirement community. *J Gerontol*. 1972;27(4):511-523.
28. Levinson D, Kaplan G. What does Self Rated Mental Health represent. *J Public Health Res*. 2014;3(3):287.
29. Heesch KC, Burton NW, Brown WJ. Concurrent and prospective associations between physical activity, walking and mental health in older women. *J Epidemiol Community Health*. 2011;65(9):807-813.
30. Heesch KC, van Uffelen JG, van Gellecum YR, Brown WJ. Dose-response relationships between physical activity, walking and health-related quality of life in mid-age and older women. *J Epidemiol Community Health*. 2012;66(8):670-677.
31. Menec VH. The relation between everyday activities and successful aging: a 6-year longitudinal study. *J Gerontol B Psychol Sci Soc Sci*. 2003;58(2):S74-S82.
32. Silverstein M, Parker MG. Leisure activities and quality of life among the oldest old in Sweden. *Res Aging*. 2002;24(5):528-547.
33. Adams KB, Leibbrandt S, Moon H. A critical review of the literature on social and leisure activity and wellbeing in later life. *Ageing Soc*. 2011;31(4):683-712.
34. Santini ZI, Koyanagi A, Tyrovolas S, et al. The protective properties of Act-Belong-Commit indicators against incident depression, anxiety, and cognitive impairment among older Irish adults: Findings from a prospective community-based study. *Exp Gerontol*. 2017;91:79-87.
35. Cronin H, O'Regan C, Finucane C, et al. Health and aging: development of the Irish Longitudinal Study on Ageing

- ing health assessment. *J Am Geriatr Soc.* 2013;61(Suppl 2):S269-S278.
36. Kearney PM, Cronin H, O'Regan C, et al. Cohort profile: the Irish Longitudinal Study on Ageing. *Int J Epidemiol.* 2011;40(4):877-884.
  37. Whelan BJ, Savva GM. Design and methodology of the Irish Longitudinal Study on Ageing. *J Am Geriatr Soc.* 2013;61(Suppl 2):S265-S268.
  38. Diener E, Oishi S, Lucas RE. Personality, culture, and subjective well-being: emotional and cognitive evaluations of life. *Annu Rev Psychol.* 2003;54:403-425.
  39. Steptoe A, Deaton A, Stone AA. Subjective wellbeing, health, and ageing. *Lancet.* 2015;385(9968):640-648.
  40. Maslow AH. *Toward a Psychology of Being.* 2<sup>nd</sup> ed. Princeton, NJ: Van Nostrand; 1968.
  41. Doyal L, Gough I. *A Theory of Human Need.* Basingstoke, Hampshire (UK): MacMillan Education Ltd; 1991.
  42. Hyde M, Wiggins RD, Higgs P, Blane DB. A measure of quality of life in early old age: the theory, development and properties of a needs satisfaction model (CASP-19). *Aging Ment Health.* 2003;7(3):186-194.
  43. Sim J, Bartlam B, Bernard M. The CASP-19 as a measure of quality of life in old age: evaluation of its use in a retirement community. *Qual Life Res.* 2011;20(7):997-1004.
  44. Howel D. Interpreting and evaluating the CASP-19 quality of life measure in older people. *Age Ageing.* 2012;41(5):612-617.
  45. Wiggins RD, Netuveli G, Hyde M, et al. The evaluation of a self-enumerated Scale of Quality of Life (CASP-19) in the context of research on ageing: a combination of exploratory and confirmatory approaches. *Soc Indic Res.* 2008;89(1):61-77.
  46. Sexton E, King-Kallimanis BL, Conroy RM, Hickey A. Psychometric evaluation of the CASP-19 quality of life scale in an older Irish cohort. *Qual Life Res.* 2013;22(9):2549-2559.
  47. Cheung F, Lucas RE. Assessing the validity of single-item Life Satisfaction Measures: results from three large samples. *Qual Life Res.* 2014;23(10):2809-2818.
  48. Andrews FM, Withey SB. *Social Indicators of Well Being: Americans' Perception of Life Quality.* New York, NY: Plenum Press; 1976.
  49. Mawani FN, Gilmour H. Validation of self-rated mental health. *Health Reports.* 2010;21(3):61-75.
  50. Ahmad F, Jhaji AK, Stewart DE, et al. Single item measures of self-rated mental health: a scoping review. *BMC Health Serv Res.* 2014;14:398.
  51. Fleishman JA, Zuvekas SH. Global self-rated mental health: associations with other mental health measures and with role functioning. *Med Care.* 2007;45(7):602-609.
  52. Cohen S, Underwood LG, Gottlieb BH, eds. *Social Support Measurement and Intervention: A Guide for Health and Social Scientists.* New York, NY: Oxford University Press; 2000.
  53. Berkman LF, Syme SL. Social networks, host resistance, and mortality: a nine-year follow-up study of Alameda County residents. *Am J Epidemiol.* 1979;109(2):186-204.
  54. Melchior M, Berkman LF, Niedhammer I, et al. Social relations and self-reported health: a prospective analysis of the French Gazel cohort. *Soc Sci Med.* 2003;56(8):1817-1830.
  55. Berkman LF, Breslow AS. *Health and Ways of Living.* New York, NY: Oxford University Press; 1983.
  56. Barrett A, Burke H, Cronin H, et al. *Fifty Plus in Ireland 2011: First Results from the Irish Longitudinal Study on Ageing (TILDA).* 2011. Available at: <https://epubs.rcsi.ie/cgi/viewcontent.cgi?article=1047&context=psycholrep> Accessed July 7, 2018.
  57. Nolan A, O'Regan C, Dooley C, et al. *The Over 50s in a Changing Ireland: Economic Circumstances, Health and Well-Being. Dublin: The Irish Longitudinal Study on Ageing (TILDA).* 2014. Available at: <https://www.ucd.ie/t4cms/Wave2-Key-Findings-Report%20-%20The%20Over%2050s%20in%20a%20Changing%20Ireland.pdf>. Accessed July 7, 2018.
  58. Katz S, Ford AB, Moskowitz RW, et al. Studies of illness in the aged. the index of ADL: a standardized measure of biological and psychological function. *JAMA.* 1963;185:914-919.
  59. Radloff LS. The CES-D Scale: A self-report depression scale for research in the general population. *Appl Psychol Meas.* 1977;1(3):385-401.
  60. Hertzog C, Van Alstine J, Usala PD, et al. Measurement properties of the Center for Epidemiological Studies Depression Scale (CES-D) in older populations. *Psychol Assess.* 1990;2(1):64-72.
  61. Lewinsohn PM, Seeley JR, Roberts RE, Allen NB. Center for Epidemiologic Studies Depression Scale (CES-D) as a screening instrument for depression among community-residing older adults. *Psychol Aging.* 1997;12(2):277-287.
  62. Beekman AT, Deeg DJ, Van Limbeek J, et al. Criterion validity of the Center for Epidemiologic Studies Depression scale (CES-D): results from a community-based sample of older subjects in the Netherlands. *Psychol Med.* 1997;27(1):231-235.
  63. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand.* 1983;67(6):361-370.
  64. Spinhoven P, Ormel J, Sloekers PP, et al. A validation study of the Hospital Anxiety and Depression Scale (HADS) in different groups of Dutch subjects. *Psychol Med.* 1997;27(2):363-370.
  65. Bjelland I, Dahl AA, Haug TT, Neckelmann D. The validity of the Hospital Anxiety and Depression Scale. *J Psychosomatic Res.* 2002;52(2):69-77.
  66. Olsson I, Mykletun A, Dahl AA. The Hospital Anxiety and Depression Rating Scale: a cross-sectional study of psychometrics and case finding abilities in general practice. *BMC psychiatry.* 2005;5:46.
  67. Organisation for Economic Co-operation and Development (OECD). *OECD Guidelines on Measuring Subjective Well-being.* OECD Publishing; 2013. Available at: <http://dx.doi.org/10.1787/9789264191655-en>. Accessed June 7, 2018.
  68. Fortin M, Lapointe L, Hudon C, et al. Multimorbidity and quality of life in primary care: a systematic review. *Health Qual Life Outcomes.* 2004;2:51.
  69. Lucas RE. Long-term disability is associated with lasting changes in subjective well-being: evidence from two nationally representative longitudinal studies. *J Pers Soc Psychol.* 2007;92(4):717-730.
  70. Avlund K, Lund R, Holstein BE, Due P. Social relations as determinant of onset of disability in aging. *Arch Gerontol Geriatr.* 2004;38(1):85-99.
  71. Stuck AE, Walther JM, Nikolaus T, et al. Risk factors

- for functional status decline in community-living elderly people: a systematic literature review. *Soc Sci Med*. 1999;48(4):445-469.
72. Valtorta NK, Kanaan M, Gilbody S, et al. Loneliness and social isolation as risk factors for coronary heart disease and stroke: systematic review and meta-analysis of longitudinal observational studies. *Heart*. 2016;102(13):1009-1016.
  73. Shankar A, McMunn A, Banks J, Steptoe A. Loneliness, social isolation, and behavioral and biological health indicators in older adults. *Health Psychol*. 2011;30(4):377-385.
  74. Hubert HB, Bloch DA, Fries JF. Risk factors for physical disability in an aging cohort: the NHANES I Epidemiologic Followup Study. *J Rheumatol*. 1993;20(3):480-488.
  75. Decarlo TJ. recreation participation patterns and successful aging. *J Gerontol*. 1974;29(4):416-422.
  76. O'Brien RM. A caution regarding rules of thumb for variance inflation factors. *Qual Quant*. 2007;41(5):673-690.
  77. Lyubomirski S, Sheldon KM, Schkade D. Pursuing happiness: the architecture of sustainable change. *Rev Gen Psychol*. 2005;9(2):111-131.
  78. Huxhold O, Fiori KL, Windsor TD. The dynamic interplay of social network characteristics, subjective well-being, and health: the costs and benefits of socio-emotional selectivity. *Psychol Aging*. 2013;28(1):3-16.
  79. Conner TS, DeYoung CG, Silvia PJ. Everyday creative activity as a path to flourishing. *J Pos Psychol*. 2016:1-9.
  80. Wheatley D, Bickerton C. Subjective well-being and engagement in arts, culture and sport. *J Cult Econ*. 2017;41(1):23-45.
  81. Pressman SD, Matthews KA, Cohen S, et al. Association of enjoyable leisure activities with psychological and physical well-being. *Psychosom Med*. 2009;71(7):725-732.
  82. Shakespeare T, Whieldon A. Sing Your Heart Out: community singing as part of mental health recovery. *Med Humanit*. 2017 Nov 25. pii: medhum-2017-011195. doi: 10.1136/medhum-2017-011195. [Epub ahead of print]
  83. Clift S, Hancox G, Staricoff R, Whitmore C. *Singing and Health: A Systematic Mapping and Review of Non-Clinical Research*. Folkestone, UK: Sydney de Haan Research Centre for Arts and Health; 2008.
  84. Hornstrup T, Wikman JM, Fristrup B, et al. Fitness and health benefits of team handball training for young untrained women – a cross-disciplinary RCT on physiological adaptations and motivational aspects. *J Sport Health Sci*. 2018;7(2):139-148.
  85. In Helliwell J, Huang H, Wang S, eds. *The Social Foundations of World Happiness*. New York, NY: United Nations. Available at: <https://s3.amazonaws.com/happiness-report/2017/HR17.pdf>. Accessed July 7, 2018.
  86. Pinquart M, Sorensen S. Influences of socioeconomic status, social network, and competence on subjective well-being in later life: a meta-analysis. *Psychol Aging*. 2000;15(2):187-224.
  87. Pinquart M. Creating and maintaining purpose in life in old age: a meta-analysis. *Ageing Int*. 2002;27(2):90-114.
  88. Litwin H, Shiovitz-Ezra S. Social network type and subjective well-being in a national sample of older Americans. *Gerontologist*. 2011;51(3):379-388.
  89. Cornwell EY, Waite LJ. Social disconnectedness, perceived isolation, and health among older adults. *J Health Soc Behav*. 2009;50(1):31-48.
  90. Lei X, Shen Y, Smith JP, Zhou G. Do social networks improve Chinese adults' subjective well-being? *J Econ Ageing*. 2015;6:57-67.
  91. Heady B, Wearing A. *Understanding Happiness: A Theory of Subjective Wellbeing*. Melbourne, Australia: Longman Cheshire; 1992.
  92. Csikszentmihalyi M. *Flow: The Psychology of Optimal Experience*. New York, NY: Harper Perennial; 1990.
  93. Wang M, Wong MCS. Happiness and leisure across countries: evidence from international survey data. *J Happiness Stud*. 2014;15(1):85-118.
  94. Meier S, Stutzer A. Is volunteering rewarding in itself? *Economica*. 2008;75(297):39-59.
  95. Thoits PA, Hewitt LN. Volunteer work and well-being. *J Health Soc Behav*. 2001:115-131.
  96. Prince M, Patel V, Saxena S, et al. No health without mental health. *Lancet*. 2007;370(9590):859-877.
  97. Santini ZI, Nielsen L, Hinrichsen C, et al. The association between Act-Belong-Commit indicators and problem drinking among older Irish adults: findings from a prospective analysis of the Irish Longitudinal Study on Ageing (TILDA). *Drug Alcohol Depend*. 2017;180:323-331.
  98. Blanchflower DG, Oswald AJ. Is well-being U-shaped over the life cycle? *Soc Sci Med*. 2008;66(8):1733-1749.
  99. Garcia I, Molina A, Navarro M. How satisfied are spouses with their leisure time? *J Fam Econ Issues*. 2007;28:546-565.
  100. Harvie D, Slater G, Philp B, Wheatley D. Economic well-being and British regions: the problem with GDP per capita. *Rev Soc Econ*. 2009;67(4):483-505.
  101. Anwar-McHenry J, Donovan RJ, Jalleh G, Laws A. Impact evaluation of the Act-Belong-Commit mental health promotion campaign. *J Public Ment Health*. 2012;11(4):186-194.
  102. Barry MM. Addressing the determinants of positive mental health: concepts, evidence and practice. *Int J Ment Health Promot*. 2009;11(3):4-17.
  103. Barry MM. Generic principles of effective mental health promotion. *Int J Ment Health Promot*. 2007;9(2):4-16.
  104. Herman H, Jané-Llopis E. The status of mental health promotion. *Public Health Rev*. 2012;34(2):1-21.
  105. Huisman M, Poppelaars J, van der Horst M, et al. Cohort profile: the Longitudinal Aging Study Amsterdam. *Int J Epidemiol*. 2011;40(4):868-876.
  106. Batty GD, Gale CR. Impact of resurvey non-response on the associations between baseline risk factors and cardiovascular disease mortality: prospective cohort study. *J Epidemiology Community Health*. 2009;63(11):952-955.
  107. Bergman P, Ahlberg G, Forsell Y, Lundberg I. Non-participation in the second wave of the PART study on mental disorder and its effects on risk estimates. *Int J Soc Psychiatry*. 2010;56(2):119-132.
  108. Lawton MP. Personality and affective correlates of leisure activity participation by older people. *J Leis Res*. 1994;26(2):138-157.
  109. Ernst JM, Cacioppo JT. Lonely hearts: psychological perspectives on loneliness. *Appl Prev Psychol*. 1999;8(1):1-22.