6 Physical activity, sedentary behaviour and mental health

Céline De Looze and Cillian McDowell

Contents

tilda
Staidéar Fadaimseartha na hÉireann um Dhul in Aois
The Irish Longitudinal Study on Ageing

6 Physical activity, sedentary behaviour and mental health

Key Findings

- Almost a quarter (22%) of older adults in Ireland did not meet mimimum recommended levels of physical activity during the COVID-19 pandemic; 43% were minimally active; a third (34%) report engaging in “health enhancing” levels of physical activity.
- Physical activity levels differed by age: Inactive (60-69 years: 19%; 70+ years: 26%); Minimally active (60-69: 41%; 70+: 47%); Active (60-69: 40%; 70+: 27%)
- Women (25%), older adults aged 70+ (26%), and those with primary education or none (27%) are more likely to be physically inactive.
- Most older adults exercise at home about the same amount of time during the COVID-19 pandemic as before the pandemic; 17% increased their exercise at home, while 16% decreased it.
- A third (36%) walk as often during the COVID-19 pandemic as before the pandemic; a quarter (25%) walk less often and a quarter (27%) walk more often.
- A large proportion (45%) of older adults increased DIY at home or gardening.
- A substantial proportion (37%) watch TV more often.
- 37% of older adults report low levels of life satisfaction.
- 21% report potentially clinically meaningful levels of depressive symptoms.
- 29% report high levels of stress and 11% have moderate-to-severe anxiety levels.
- Adults aged 60-69, those who have a third level of education or higher and those who live in urban areas are more likely to be the least satisfied with their life.

- Women, adults with a primary level of education and those who live alone are more likely to report the highest levels of stress, anxiety and depressive symptoms.

- Adults who live in urban areas also more likely to have depressive symptoms.

- Low levels of physical activity are associated with lower levels of life satisfaction, higher levels of stress, anxiety and depressive symptoms.

- Strategies to address the high levels of poor mental health among older adults in Ireland throughout the COVID-19 pandemic, including the promotion and facilitation of physical activity, should be developed as a matter of urgency.

6.1 Introduction

The promotion and protection of good mental health in old age is becoming a major societal concern. Approximately 9% and 24% of TILDA participants had potentially clinically meaningful levels of depression and anxiety symptoms, respectively. (1) These mental health problems need not be an inevitable part of the ageing process; however, it is possible that they have been amplified by the COVID-19 pandemic which has profoundly impacted daily life. Early evidence from the UK has shown that mental health had deteriorated compared with pre-COVID-19 trends among younger but not older adults; however, it is likely that different subpopulations among older adults have had different experiences. (2)

The physical health benefits of being physically active, including protection against cardiovascular diseases, cancers and diabetes, and reduced mortality risk, are well established. (3) The mental health benefits are also well known. Previous evidence from TILDA has shown that participants who are physically active are less likely to develop mental health issues such as depression or anxiety. (4,5) International data from throughout COVID-19 has suggested that people are spending less time in physical activity and more time in sedentary behaviours, and that these changes are associated with a range poorer mental health outcomes. (6) Evidence from Sport Ireland showed a strong decline in sport participation and slight increase in recreational walking among adults aged ≥55 years. (7) Given the emphasis placed on “cocooning” in the COVID-19 containment strategies, it seems likely that older adults in Ireland may have also reduced their activity and increased their sedentary time.

The purpose of this chapter is to explore physical activity, sedentary behaviour, and mental health in over 60’s in Ireland during the COVID-19 pandemic. This chapter is split into two primary sections. The first section describes physical activity and sedentary behaviour using the short-form International Physical Activity Questionnaire and questions on perceived changes in participation in specific physical activities and sedentary behaviours compared to before the outbreak of COVID-19. We then examine differences in physical activity and sedentary behaviour according to a number of sociodemographic characteristics. The second section describes mental health in the same population and according to the same sociodemographic characteristics. We also examine the relationships between mental health and physical activity.

6.2 Physical activity and sedentary behaviour

6.2.1 Physical activity

Physical activity consists of various activities like active transport, gardening, and exercise. It can range from light intensity (for example, a gentle stroll) to moderate intensity (for example an activity that increases your breathing rate to the point that it would be difficult to sing a song, but you could still hold a conversation) and high intensity (for example, where your breathing has increased to the point that it would be difficult to hold a conversation).

TILDA assesses physical activity using the above criteria derived from short-form version of the International Physical Activity Questionnaire. (8) This questionnaire asks participants about how much walking, moderate and vigorous intensity physical activity they did in the past seven days. Responses to these questions are summed and divided into three categories: Low (i.e., not meeting minimum recommended levels of physical activity); Moderate (i.e., minimally active); and High (i.e., engaged in "health enhancing physical activity"). Most participants were in the Moderate category (43%), followed by the High (34%) and Low (22%) categories. This differs from the previous wave of TILDA (i.e., Wave 5) where 37% were in the Moderate category, 37% were in the Low category, and 26% were in the High category. This indicates that there has been a slight decrease in the number of people engaging in health-enhancing physical activity but a slight increase in the number of people who are minimally active.

Participants also report perceived changes in participation in specific physical activities before and after the outbreak. These activities include exercising at home, walking outside for more than 20 minutes, and doing garden work or home repairs. Each of these questions has four response options (*not at all* = 0; *less often* = 1; *about the same* = 2; *more often* = 3). Table 6.1 shows the proportion of participants in each of these categories. Most participants report doing about the same amount of exercise at home compared to before the pandemic (47%), while similar proportions report increases (17%) and decreases (16%) in their exercise. A similar pattern is seen for walking. However, a large proportion of participants report increases in home DIY/gardening (45%) while few report decreases (7%) or none at all (13%).

Table 6.1. Perceived changes in specific physical activity types since the outbreak of the COVID-19 pandemic

	Not at all		Less often		About the same		More often	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Exercise at home	20	[18-21]	16	[15-18]	47	[45-49]	17	[16-19]
Walking	12	[11-14]	25	[23-27]	36	[34-38]	27	[25-29]
Home DIY/gardening	13	[11-14]	7	[6-9]	35	[33-37]	45	[43-48]

6.2.2 Sedentary behaviour

Perceived changes in participation in specific sedentary behaviours before and after the outbreak of COVID-19 are also assessed. These activities include doing hobbies, crafts, or puzzles, watching TV, Netflix, stream movies, or shows, reading books, magazines, or newspapers (in print or online), and meeting with social groups on Zoom or other online video conference sites. As above, each of these questions has four response options (*not at all* = 0; *less often* = 1; *about the same* = 2; *more often* = 3). Table 6.2 shows the proportion of participants in each of these categories. Most participants do about the same for each of the activities, although a substantial proportion of participants report watching TV more often.

Table 6.2. Perceived changes in specific sedentary behaviours since the outbreak of the COVID-19 pandemic

	Not at all		Less often		About the same		More often	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Hobbies	26	[24-28]	11	[10-12]	39	[37-41]	24	[22-26]
TV	4	[3-5]	6	[5-7]	54	[51-56]	37	[35-39]
Reading	7	[6-9]	5	[4-6]	52	[50-54]	35	[33-37]
Online socialising	63	[61-65]	6	[5-7]	10	[9-11]	22	[20-24]

6.2.3 Sociodemographic characteristics by physical activity

Table 5.3 shows the percentage of adults aged 60 years and older in each of the three physical activity groups (Low, Moderate, and High) according to their sociodemographic characteristics. Participants aged 60-69 years are more likely to be in the High physical activity category and less likely to be in the Low category. *Men* are less likely to be in the Low and Moderate categories and substantially more likely to be in the High category.

Participants with *third level education* are less likely to be in the Low category and more likely to be in the High category compared to those with primary level education. Participants living alone are more likely to be in the Moderate group but less likely to be in the High group compared to those living with others. Finally, participants in *rural* locations are less likely to be in the Moderate group but substantially more likely to be in the High group compared to those in urban locations.

Table 6.3. Physical activity by key sociodemographic characteristics

	Low		Moderate		High	
	%	95% CI	%	95% CI	%	95% CI
Age Groups						
60-69 years	19	[17-22]	41	[38-45]	40	[37-43]
70+ years	26	[23-29]	47	[44-50]	27	[24-30]
Gender						
Male	19	[16-21]	36	[33-39]	45	[42-48]
Female	25	[22-28]	49	[46-52]	26	[24-29]
Education						
Primary/none	27	[23-32]	45	[40-50]	28	[23-32]
Secondary	22	[19-25]	43	[40-46]	35	[32-38]
Third/higher	16	[13-19]	42	[39-46]	42	[38-45]
Living status						
Lives alone	21	[17-25]	51	[46-55]	29	[25-33]
Lives with other(s)	23	[21-25]	41	[39-44]	36	[34-39]
Location						
Urban	24	[22-27]	47	[44-49]	29	[27-32]
Rural	20	[17-23]	39	[36-42]	41	[38-44]

6.3 Mental health

6.3.1 Mental health measures

TILDA uses several measures to assess an individual's mental health. In this report, we include measures of life satisfaction, perceived stress, anxiety and symptoms of depression.

Self-rated life satisfaction. The participant is asked to rate how satisfied they are with their life from 1 to 10 (1 = *Not at all satisfied*; 10 = *Completely satisfied*). The higher the score, the more satisfied the participant is with their life. Average life satisfaction during the COVID-19 pandemic is moderate (mean=7.7).

Perceived stress. Perceived stress is assessed using a four-item version of the Perceived Stress Scale (PSS-4). (9) The PSS-4 includes four questions about how the participant felt during the COVID-19 pandemic:

- How often have you felt that you were unable to control the important things in your life?
- How often have you felt confident about your ability to handle your personal problems?
- How often have you felt that things were going your way?
- How often have you felt difficulties were piling up so high that you could not overcome them?

The participant is asked to answer each question, using a five-point scale, ranging from *Never* (0) to *Very Often* (4). Responses to the four items are summed to assess global stress perception, with a maximum score of 16. The higher the score, the higher the levels of perceived stress. Perceived stress levels during the COVID-19 pandemic are on average moderate (mean=4.7). Perceived stress levels in the previous wave of TILDA (i.e., Wave 5) was on average low-to-moderate (mean=3.9) for the same cohort of participants, which indicates that perceived stress increased during the COVID-19 pandemic.

Anxiety. Anxiety is measured using the Generalised Anxiety Disorder Assessment (GAD-7). (10) This measurement tool is composed of 7 items which assess how worried, tense or anxious an individual felt over the last week:

- Feeling nervous, anxious or on edge
- Not being able to stop or control worrying
- Worrying too much about different things
- Trouble relaxing
- Being so restless that it is hard to sit still
- Becoming easily annoyed or irritable
- Feeling afraid as it something awful might happen

The participant is asked to rate each of the seven items using a four-option response (0=*Not at all*; 1=*several days*; 2=*More than half the days*; 3=*nearly every day*). Responses to the seven items are summed to a maximum score of 21. The higher the score, the higher the anxiety levels. On average, anxiety levels during the COVID-19 pandemic are low (mean=3.1).

Depression. Symptoms of depression are measured using a short version of the Center for Epidemiologic Studies Depression Scale (CESD). (11) The participant is asked how often they experienced a variety of depressive symptoms during the COVID-19 pandemic. The short version of the CESD scale consists of 8 items:

- I felt depressed
- I felt that everything I did was an effort
- My sleep was restless
- I was happy
- I felt lonely
- I enjoyed life
- I felt sad
- I could not get "going"

Each item has four response options (0= *Rarely or none of the time*; 1= *Some or a little of the time*; 2= *Occasionally or a moderate amount of time*; and 3= *All of the time*). Responses to the eight items are summed to a maximum score of 24. The higher the score, the higher the depressive symptoms. During the COVD-19 pandemic, participants report 5.3 symptoms on average. Twenty one percent had a score of 9 or above, which suggests that almost a quarter of the participants may present clinically significant depressive symptoms. (12) Depressive symptoms were 3.2 on average in the previous wave of TILDA (i.e. Wave 5) for the same cohort of participants and 8% presented clinically significant depressive symptoms. This indicates substantial increase in depressive symptoms during the COVID-19 pandemic.

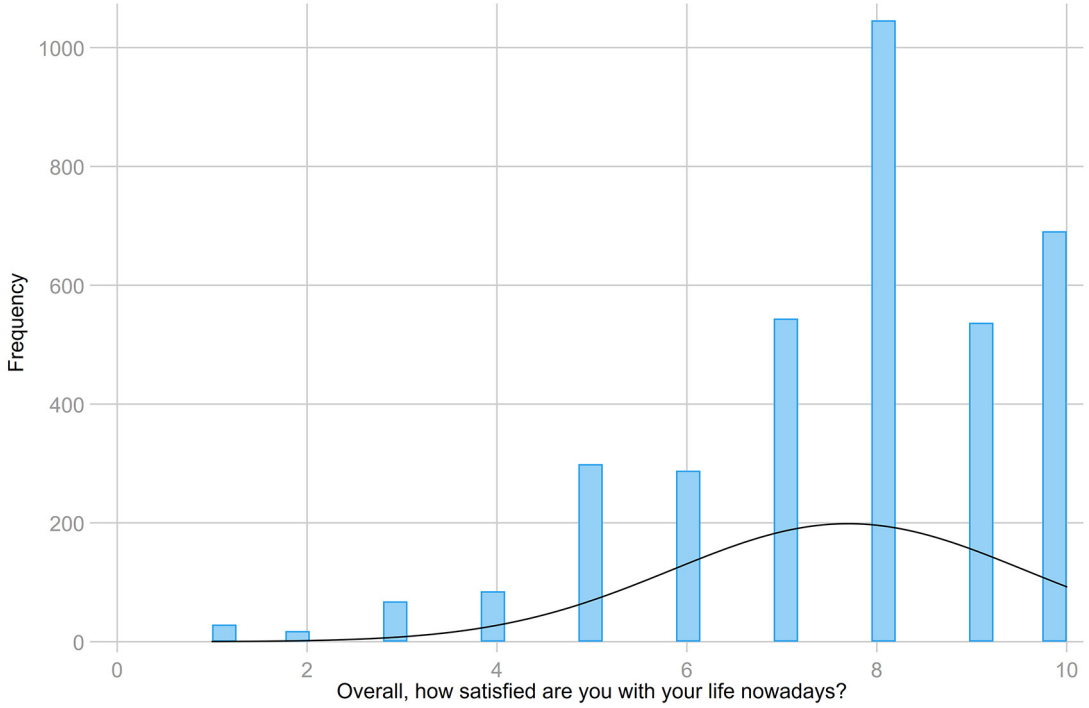
We describe in the next section the distribution of each mental health measure according to the socio-demographic characteristics of participants and their level of physical activity.

6.3.2 Sociodemographic characteristics and physical activity by mental health measures

6.3.2.1 Self-rated life satisfaction

Figure 6.1 shows the distribution of life satisfaction scores. Given the skewed distribution of life satisfaction scores, we present the scores into tertiles (three groups). The first of these three groups includes the least satisfied participants (37%) who have a score below seven on the life satisfaction scale. The middle group (42%) score eight or nine, while the most satisfied group (21%) score ten.

Figure 6.1. Distribution of life satisfaction scores



As shown in Table 6.4, similar levels of self-rated life satisfaction are reported by men and women. Participants aged 60-69 years are more likely to be the least satisfied with their life (36%). There is also a clear education gradient. Participants who completed a third level of education (15%) are significantly less likely to be the most satisfied with their life compared to those with a primary level of education (27%). There is no statistically difference in self-rated life satisfaction according to whether older adults live alone or with others. Participants who live in urban areas (40%) are significantly more likely than those from rural areas (32%) to be in the least satisfied group. Finally, participants with low level of physical activity are more likely to be the least satisfied (46%).

Table 6.4. Self-rated life satisfaction by key sociodemographic characteristics and physical activity

	Least satisfied		Moderately satisfied		Most satisfied	
	%	95% CI	%	95% CI	%	95% CI
Gender						
Male	35	[32-38]	45	[42-48]	20	[18-23]
Female	39	[36-42]	40	[37-43]	22	[19-24]
Age group						
60-69 years	36	[33-39]	46	[43-49]	18	[15-20]
70+ years	38	[35-40]	38	[35-41]	24	[22-27]
Education						
Primary/none	38	[34-43]	35	[31-39]	27	[23-31]
Secondary	35	[33-38]	46	[43-49]	19	[16-21]
Third/higher	38	[35-41]	48	[45-50]	15	[13-17]
Living status						
Lives alone	38	[34-42]	38	[34-42]	24	[20-27]
Lives with other(s)	36	[34-39]	44	[41-46]	20	[18-22]
Location						
Urban	40	[38-43]	42	[39-45]	18	[16-20]
Rural	32	[29-35]	42	[39-45]	26	[23-29]
Physical activity						
Low	46	[41-51]	35	[30-40]	19	[15-23]
Moderate	37	[34-40]	42	[39-46]	21	[18-24]
High	29	[25-32]	52	[48-56]	19	[17-23]

6.3.2.2 Perceived stress

Similar to the life satisfaction scale, the distribution of perceived stress scores is skewed. Therefore, we present the scores into tertiles (three groups). The first group includes participants who report the lowest levels of stress (34%), ranging from zero to three. The middle group (36%) report score between four and six, while the group with the highest levels of stress (29%) score between seven and sixteen.

Table 6.5 shows the distribution of the three groups of stress according to the socio-demographic characteristics and physical activity of participants during the COVID-19 pandemic. Women are significantly more likely to report high levels of stress compared to

men. For example, 31% of women report the highest levels of stress compared to 26% of men. There is no difference in stress levels between age groups. Older adults with lower level of education are also significantly more likely than those with higher level of education to report high stress levels. 35% of participants who have a primary level of education or none are more likely to be in the group with the highest levels of stress compared to 22% of those who completed a third level of education. Older adults who live alone (31%) are significantly more likely than those who live with others (28%) to report the highest levels of stress. Similar levels of stress are reported by rural and urban participants. Finally, participants with low level of activity are more likely to report the highest levels of stress (36%).

Table 6.5. Stress by key sociodemographic characteristics and physical activity

	Least stressed		Moderately stressed		Most stressed	
	%	95% CI	%	95% CI	%	95% CI
Gender						
Male	37	[34-40]	37	[34-40]	26	[23-29]
Female	32	[30-35]	37	[34-39]	31	[28-34]
Age group						
60-69 years	36	[33-39]	46	[43-49]	18	[15-20]
70+ years	38	[35-40]	38	[35-41]	24	[22-27]
Education						
Primary/none	31	[27-35]	35	[30-39]	35	[31-39]
Secondary	37	[34-40]	37	[35-40]	26	[24-29]
Third/higher	38	[35-40]	40	[37-43]	22	[20-25]
Living status						
Lives alone	38	[34-42]	32	[28-36]	31	[27-35]
Lives with other(s)	33	[31-36]	39	[36-41]	28	[26-30]
Location						
Urban	34	[31-37]	38	[35-40]	29	[26-31]
Rural	36	[32-39]	36	[33-39]	29	[26-32]
Physical activity						
Low	27	[23-32]	37	[32-42]	36	[31-41]
Moderate	34	[30-37]	39	[35-42]	28	[25-31]
High	43	[39-47]	36	[33-40]	21	[18-24]

6.3.2.3 Anxiety

Anxiety levels range from 0 to 21. They can be divided into four categories according to established criteria (13): minimal (between 0 and 4; 73%), mild (between 5 and 9; 16%), moderate (between 10 and 14; 8%) and severe (15 or more; 3%).

Table 6.6 shows the distribution of the four levels of anxiety according to the socio-demographic characteristics and physical activity of participants during the COVID-19 pandemic. Similarly to the stress scale, women are significantly more likely to report higher levels of anxiety than men. For example, 10% of women report moderate levels of stress compared to 5% of men. There was no difference in anxiety levels according to age groups. Older adults with lower level of education are significantly more likely than those with higher level of education to report high levels of anxiety. 4% of participants with primary education or none are in the group with severe levels of anxiety compared to 2% of those who completed a third level of education. Older adults who live alone were significantly more likely to report severe levels of anxiety (5%, 95%CI: 3-7) compared to those who live with others (2%. There is no significant difference in anxiety levels according to whether participants live in urban or rural areas. Finally, older adults who reported low level of physical activity were more likely to be in the group with severe levels of anxiety (3%) and less likely to be in the group with minimal levels of anxiety (70%) compared to those with high level of physical activity (78%).

Table 6.6. Anxiety by key sociodemographic characteristics and physical activity

	Minimal levels of anxiety		Mild levels of anxiety		Moderate levels of anxiety		Severe levels of anxiety	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Gender								
Male	79	[76-81]	14	[12-16]	5	[4-7]	2	[2-4]
Female	67	[64-70]	19	[17-21]	10	[9-13]	3	[2-5]
Age group								
60-69 years	72	[69-75]	16	[14-18]	9	[7-11]	3	[2-5]
70+ years	74	[71-76]	17	[15-19]	7	[6-9]	3	[2-4]
Education								
Primary/none	72	[67-76]	15	[12-19]	9	[7-12]	4	[3-7]
Secondary	73	[70-75]	17	[15-19]	8	[7-10]	2	[2-3]
Third/higher	76	[73-78]	18	[16-20]	5	[4-6]	2	[1-3]
Living status								
Lives alone	73	[69-77]	14	[12-17]	8	[6-11]	5	[3-7]
Lives with other(s)	73	[70-75]	17	[15-19]	8	[7-9]	2	[2-3]
Location								
Urban	72	[69-75]	17	[15-19]	9	[7-11]	2	[2-4]
Rural	74	[71-77]	16	[13-19]	7	[5-9]	4	[2-5]
Physical activity								
Low	70	[65-74]	18	[15-22]	9	[6-13]	3	[2-6]
Moderate	73	[69-76]	18	[15-21]	7	[5-9]	3	[2-4]
High	78	[75-81]	13	[11-16]	6	[4-8]	2	[1-4]

6.3.2.4 Depression

Levels of depression range from 0 to 24. Typically, a score of 9 or above indicates clinically significant depressive symptoms. (12) 79% have a score below 9 and 21% scored 9 or above.

Table 6.7 shows the distribution of depression levels according to the socio- demographic characteristics and physical activity of participants during the COVID-19 pandemic. Women are significantly more likely to report higher levels of depression symptoms than men. For example, 26% of women are in the group with clinically significant depressive symptoms compared to 16% of men. There was no difference in depression levels

according to age groups. Participants with primary education or none (24% are significantly more likely to be in the group with depressive symptoms than those who completed a third level of education or higher (17%). Participants who live alone (27%) are more likely than participants who live with others (19%) to report higher levels of depression symptoms. Urban participants (23%) are also more likely than rural participants (18%) to have clinically significant symptoms of depression. Finally, older adults who reported low level of physical activity are more likely to be in the group with depressive symptoms (27%).

Table 6.7. Depression by key sociodemographic characteristics and physical activity

	Not depressed		Depressed	
	%	95% CI	%	95% CI
Gender				
Male	84	[82-87]	16	[13-18]
Female	74	[71-77]	26	[23-29]
Age group				
60-69 years	80	[78-83]	20	[17-22]
70+ years	78	[75-80]	22	[20-25]
Education				
Primary/none	76	[72-80]	24	[20-28]
Secondary	79	[76-81]	21	[19-24]
Third/higher	83	[81-86]	17	[14-19]
Living status				
Lives alone	73	[69-77]	27	[23-31]
Lives with other(s)	81	[79-83]	19	[17-21]
Location				
Urban	77	[74-79]	23	[21-26]
Rural	82	[79-85]	18	[15-21]
Physical activity				
Low	73	[68-77]	27	[23-32]
Moderate	79	[75-82]	21	[18-25]
High	86	[83-88]	14	[12-17]

6.4 Discussion

This report highlights the low levels of physical activity among older adults in Ireland during the COVID-19 pandemic, particularly among adults aged 70 years and over, women, and those with a primary level education. There are some changes in participation in specific physical activities compared to pre-pandemic levels: equal proportions of participants report increases in exercise and walking, but substantially more report increases than decreases in home DIY and gardening. A substantial proportion of participants however report increased engagement in each of the specific sedentary behaviours assessed, with few reporting decreases in these behaviours.

Worryingly, almost one quarter of older adults report levels of depressive symptoms that are potentially clinically meaningful. This is substantially higher than has been found in previous waves of TILDA. For example, in Wave 5 in 2018, 8% of the same cohort of participants had potentially clinically meaningful levels of depressive symptoms. It seems likely that this increase in depressive symptoms is at least in part due to the COVID-19 pandemic. Efforts to control the spread of the virus while maintaining and promoting mental health need to be strengthened as a matter of urgency.

Prevalence of depression is highest among women, those with a primary level education, those living alone and those living in urban areas. These factors, with the exception of area of living, are also associated with having severe levels of anxiety and higher levels of stress. Public health should pay particular attention to supporting these subgroups. Lowest scores of life satisfaction are more prevalent among participants aged 60-69 years, with a third level education, and living in urban areas. It is possible that these subgroups are more affected by lifestyle changes resulting from the COVID-19 pandemic. Given that individuals with lowest levels of life satisfaction are also more likely to report higher levels of stress and anxiety and have depressive symptoms, public health should also consider the longer-term impact of the COVID-19 pandemic.

Finally, participants with low physical activity are also the most likely to be in the highest group for depression, anxiety, and stress, and the lowest group for life satisfaction. Although these findings are cross-sectional, they support international data from throughout the COVID-19 pandemic that has shown that decreases in physical activity are associated with a range of poorer mental health outcomes. (6) Moreover, previous research from TILDA and internationally has highlighted the important role that physical activity may play in protecting against, and treating, depression and anxiety. (4 ,5,14) Increasing activity among older adults not meeting minimum recommended physical

activity levels will likely yield positive mental and physical health benefits. Indeed, some efforts to promote participation in physical activity throughout the pandemic have been made, such as the national Get Up Get Dressed Get Moving campaign; however, more work is needed and public health should target efforts on older adults not meeting minimum recommended levels of physical activity.

References

1. Gallagher D, O'Regan C, Savva GM, Cronin H, Lawlor BA, Kenny RA. Depression, anxiety and cardiovascular disease: which symptoms are associated with increased risk in community dwelling older adults? Journal of affective disorders. 2012;142(1-3):132-138.

2. Pierce M, Hope H, Ford T, et al. Mental health before and during the COVID-19 pandemic: a longitudinal probability sample survey of the UK population. The Lancet Psychiatry. 2020;7(10):883-892.

3. Organisation WH. Physical Activity. https://www.who.int/news-room/fact-sheets/detail/physical-activity. Published 2020. Accessed 03 December, 2020.

4. McDowell C, Dishman R, Hallgren M, MacDonncha C, Herring M. Associations of physical activity and depression: results from the Irish longitudinal study on ageing. Experimental gerontology. 2018;112:68-75.

5. McDowell CP, Dishman RK, Vancampfort D, et al. Physical activity and generalized anxiety disorder: results from The Irish Longitudinal Study on Ageing (TILDA). International Journal of Epidemiology. 2018;47(5):1443-1453.

6. Meyer J, McDowell C, Lansing J, et al. Changes in physical activity and sedentary behavior in response to COVID-19 and their associations with mental health in 3052 US adults. International journal of environmental research and public health. 2020;17(18).

7. Ireland S. Impact of Covid-19 Restrictions on Sport and Recreational Walking. 2020.

8. Craig CL, Marshall AL, Sjöström M, et al. International physical activity questionnaire: 12-country reliability and validity. Medicine & science in sports & exercise. 2003;35(8):1381-1395.

9. Cohen S K, T. and Mermelstein, R. . Perceived stress scale. Measuring stress: A guide for health and social scientists. Vol 101994.

10. Löwe B, Decker, O., Müller, S., Brähler, E., Schellberg, D., Herzog, W., & Herzberg, P. Y. Validation and standardization of the Generalized Anxiety Disorder Screener (GAD-7) in the general population. Medical care. 2008 46(3):266.

11. Lewinsohn PM SJ, 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.

12. Briggs R, Carey, D., O'Halloran, A.M., Kenny, R.A. and Kennelly, S.P. Validation of the 8-item Centre for Epidemiological Studies Depression Scale in a cohort of community-dwelling older people: data from The Irish Longitudinal Study on Ageing (TILDA). . European Geriatric Medicine. 2018;9(1):121-126.

13. Spitzer RL, Kroenke, K., Williams, J.B. and Löwe, B. A brief measure for assessing generalized anxiety disorder: the GAD-7. Archives of internal medicine. 2006;166(10):1092-1097.

14. Rebar AL, Stanton R, Geard D, Short C, Duncan MJ, Vandelanotte C. A meta-meta-analysis of the effect of physical activity on depression and anxiety in non-clinical adult populations. Health psychology review. 2015;9(3):366-37